The Builder.

VOL. LVII. No. 2426. SATURDAY, AUGUST 3, 1889.

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The Report of the Committee on Town Holdings.

THE long-expected Report of the Committee of the House of Commons on Town Holdings, which was appointed in 1886, and which sat in that year as well as in 1887 and 1888, has at length been issued. In one sense it is a partial report only, since the important subject of the imposition of "a direct assessment on the owners of ground-rents, and on the owners of increased values imparted to land by building operations or other improvements," is not dealt with in the Report. Further evidence is to be given before the Committee can come to a conclusion on this matter. The Committee itself was a very large and representative one. It consisted of twenty-five members, including among the number men so Conservative and so well acquainted with the subject as Sir John Ellis and Mr. Elton, Q.C., and Radicals so pronounced as Mr. H. Lawson and Mr. Conybeare. It will, therefore, be difficult for the advocates of the present state of things or of changes to take much exception to this Report. It seems to us to represent the views of most candid and businesslike men, and to show that the Committee have considered the subject with the solid good sense which characterises Englishmen when they give up party politics in the serener atmosphere of a Committee-room.

The Report, as now issued, is easily divisible into two parts. For the present we omit altogether any consideration of the portion which deals with Ireland, except in so far as it is affected by any general principles laid down in the body of the Report. These two parts are, firstly, what is popularly called leasehold enfranchisement; and, secondly, compensation for goodwill and improvements. It is on the latter part we propose to touch first. As regards goodwill, the conclusion of the Committee is that, independently of improvement, it is of an ephemeral character. Therefore the Committee say no more about it. We now come to a limited class of improvements, viz., those of a sanitary nature. These we have always urged it should be in the power of a tenant to do, and for them he should receive compensation. In regard to this the Committee recommend as follow:—"The Committee further recommend legislation to secure to tenants, whether under existing or future contracts, the right to compensation at the expiration of the lease, on an equitable basis, for alterations made for improving the sanitary condition of their premises." This is a sound and proper recommendation, but care will have to be taken in any such measure that only necessary and reasonable sanitary repairs are to be paid for by a landlord, for hobbies and sanitary extravagances ought not to be forced on him. It is, however, an immense step in advance to find sanitary needs thus recognised by a representative Committee of the House of Commons, and it shows how the subject has grown in public opinion. Nothing in the above paragraph points to the need for any previous notice in writing to the landlord, and consent from him, before the tenant executes sanitary repairs; in many cases the necessity of such a consent would practically put a stop to the execution of the work at all. But if necessary sanitary work is not done by a landlord, the tenant should have the right to do it, and be recouped by the landlord at the end of the term, whether the latter consents or not. We lay some stress on this point of a written consent because we find it strongly marked in another paragraph of the Report which deals with "substantial improvements." The recommendation of the Committee on this head is as follows:—

"A suggestion of a comparatively limited character has been made to the effect that under either an existing or a future contract of tenancy, a tenant, whether of business premises or of a dwelling-house, effecting substantial improvements with the previous written consent of the landlord, shall be entitled to claim compensation at the expiration of the tenancy. We see no objection to this proposal, and think it might have some effect in facilitating the making of improvements."

But a sanitary alteration is a substantial improvement, and we feel some doubt whether or not the question of sanitary improvements is included in this paragraph. We are inclined to presume not, and, for the reasons already given, we should hope it is not. For an Act based on the paragraph we have just quoted would do little more than enunciate what is now the law in the case of many reasonable landlords and tenants, who make arrangements by contract beneficial to each.

We now approach another, and in some respects more important, head in reference to improvements, viz., those of purely business premises:—

"With regard to future contracts of tenancy the Committee feel that no injustice would be involved in such an alteration of the law as would entitle the tenant of trade or business premises, on the expiration of his tenancy, to compensation for such improvements as he may have *bond-fide* made for the purpose of carrying on his trade or business, and as may have added to the permanent letting value of the premises. This would, in our opinion, promote the making of improvements, and would secure to the tenant the increased value of the premises, which he has undoubtedly created by his own expenditure. At first such a change in the law might give rise to many inconveniences and, perhaps, hardships; but, when the practice was once established, the questions arising would probably, in the majority of cases, be settled by agreement or by some system of reference, without a necessity for legal proceedings. The right to compensation should, we think, be limited to the case of trading and business premises. As regards alterations and improvements to dwelling-houses, great difficulty would often arise in deciding whether the value of the house had actually been increased by the expenditure, nor is there the urgency upon the tenant of a residence to improve or enlarge it, as there often is on the owner of a business to alter his premises in order to accommodate a growing trade.

The exercise of this right would have to be strictly safeguarded, so as to prevent its being used by a tenant to annoy or embarrass the lessor. With this object, it would be proper for the tenant, before effecting any improvements for which he intends to claim compensation, to give full notice to the landlord of the nature of such improvements, and of the amount proposed to be expended upon them, so as to give the landlord an opportunity to check the alterations of the property, and if they are injurious to him, to stop them. The landlord should be allowed, if he thinks fit, to execute the suggested improvements himself, on the tenant paying him, by way of increased rent, a fair rate of interest on the capital so expended.

In no case should a tenant be entitled to compensation for improvements if his landlord is willing to renew his lease at a fair rent, independently of the value of such improvements, and care would have to be taken not to give a right to compensation against a landlord who may himself be only a lessee, unless he has a corresponding right against the freeholder.

It appears to the Committee that many reasons may be adduced in favour of legislation based on the principles just described; but, the subject being one of great difficulty and complexity, the Committee, while considering it their duty to indicate the nature of a possible remedy for grievances, the existence of which they recognise, are not prepared to do more than record their opinion that a carefully-framed measure on this subject, based on the principles just mentioned, would probably be of public advantage."

We have quoted this part of the Report in

arfenso because it cannot be summarised accurately so as to give a proper impression of it. Its importance is great. It would introduce quite a new principle into the relation of landlord and tenant in towns, a principle which has been recognised hitherto only in agricultural tenancies. It shows that when a principle is introduced into one class of contracts it is almost certain sooner or later to extend to others of an analogous character. It will be observed (to criticise the portion of the Report quoted above) that notice is to be given to the landlord, who may thus be able "to stop" the improvements if they are injurious to him. The question which naturally arises is, Do the Committee intend the landlord to have in all cases a veto on the proposed improvement? Is his consent to be a condition precedent to their execution? If it is, the proposed legislation would have very small application; if it is not, the reverse will happen. For under the existing state of things a tenant can always apply for his landlord's consent, and if so, it is difficult to see how, if consent is necessary, the position of the tenant will be much bettered. Consent is necessary under the provisions of the Agricultural Holdings Act, but that Act has done little more than put into an Act of Parliament arrangements which were constantly made before it came into operation.

It will be thus seen that the Report of the Committee on this branch of the subject suggests legislation under several heads. It suggests (*a*) compensation for sanitary improvements without the consent of the landlord,—so, at least, we are inclined to read the Report; (*b*) compensation for material improvements in dwelling-houses with the landlord's consent; and (*c*) compensation for improved value of business premises in consequence of alterations which a landlord has the power to "stop." Assuming that in the near future the recommendations of the Committee are embodied by the Legislature in an Act of Parliament, so far as refers to towns, it is certain that at no very distant date such legislation must be applied to the whole country. The occupier of business premises in a village will demand the same rights as his fellow in the town, and the occupier of a country house in Middlesex will ask for the same rights in regard to sanitary improvements as the householder in Bayswater or Kensington.

Having thus pointed out the salient portions of the Report of the Committee on one main branch of the subject sent to them for investigation, we have now to deal with the interesting and lengthy comments which are concerned with the subject of leasehold tenure and leasehold enfranchisement. Part of this section of the Report is a summary of building tenures and their distribution throughout England, and the variation of tenure is remarkable. We find, for example, that "In Warwickshire, Birmingham is mainly a leasehold town, the Corporation estates being granted on 75 years' leases, and other large estates on 99 years' terms. The other towns are freehold." This is but one example, but it will be found on examination that, as a rule, most provincial towns are either erected mainly on freehold or mainly on leasehold tenures. Of course, there are noticeable exceptions to this rule; but, looking at England as a whole, this rule appears to be deducible from the results of the Committee's investigations. Thus, Plymouth, Exeter, Barnstaple, and Tiverton are freehold towns; while Cardiff, Merthyr Tydfil, Newport, and Carmarthen are held on 99 years' leases. At some future time, perhaps, a social inquirer may investigate the subject, and some results may be obtained showing if tenure has had any and what effect on the moral and political character of the people.

With this diversity of tenure throughout the country, it was quite certain that the committee-room in which this particular Parliamentary body held its sittings would be the battle-ground of the upholders of the two different systems. To put it more accurately, the leasehold system was on its trial for, as we all know, social and legal reformers have for a long time made the condemnation of the leasehold system a favourite cry. It has been held responsible not only for structural defects in houses, for bad building, but for moral, physical, and sanitary defects. On the whole, the victory is clearly with the leasehold system; that is to say, the Committee do not find that it is worse than the freehold system. In one respect, indeed, it is pronounced to be the superior to the freehold system, namely, in regard to the facilities which it gives for the more rapid development of land,—"The Committee agree with the opinion that the plan of letting land for building upon an annual rent, which is a leading feature of the leasehold system, possesses considerable advantage and convenience; and they have on the whole come to the conclusion that, except in places where the sentiment of the district is strongly opposed to leasehold, houses are built and building estates are developed more rapidly on the leasehold system than on that of freehold purchase, and that, in consequence of the large supply of houses thus caused, occupiers obtain the benefits of lower rents and greater opportunities of selection; but there is no evidence that towns where the freehold system prevails have suffered in consequence." It must be confessed that this last sentence is somewhat ambiguous, and rather in contradiction, as it appears to us, of the previous assertion. For if, under a leasehold tenure, houses are built and building estates are developed more rapidly, and the people are consequently thereby benefited, then it follows that localities must be injuriously affected where the leasehold tenure does not prevail; or, on the other hand, if this is not so, then the first statement is too favourable to leasehold tenure. But, broadly stated, the opinion of the Committee is in favour on this point of leasehold tenure,—that is to say, it is placed, at the lowest, on equal terms with freehold tenure.

But facility in developing estates, and a large supply of houses, would not counterbalance the disadvantages, sanitary and moral, if they exist, which have been placed in array against the leasehold system. An immense mass of evidence has been laid before the Committee on the subject of bad building and state of repair, and the verdict is again in favour of leasehold tenure; or, again, to speak by the card, the accusations against it are held not to be proven. The conclusion of the Committee on this head is most important, being the first competent and thoroughly considered judicial opinion on the point. As such it should silence the opponents of the leasehold system, for no candid man can fail to bow, to some extent at least, to the authority of the conclusion which the Committee has reached. It is as follows:—

"After carefully considering the evidence of the witnesses who maintain the advantages of the freehold and leasehold systems respectively, as regards the character of houses erected under them, we cannot fully adopt the conclusion contended for on either side. We are unable to satisfy ourselves that, as a general rule, the nature of the tenure under the freehold and leasehold systems has any considerable effect in determining the class and quality of houses erected. We think that any system under which the builder obtains the land without any expenditure of capital, to some extent affords facilities for the operations of the less substantial and more speculative class of builders, but there is no evidence to show that this class of builder is not found carrying on operations in freehold towns; nor does the evidence lead to the conclusion that a comparison between freehold and leasehold towns would clearly indicate that leasehold tenure has had a bad effect on the class of houses erected in, and the general sanitary condition of the towns in which such tenure prevails.

These conclusions refer to the comparison between freehold tenure and leasehold of ninety-nine years or thereabouts. As regards shorter terms, however, we are of opinion that a man, erecting a house on a term of sixty years and under, is likely to build less substantially than if he possessed a more permanent interest, and we think that the evidence shows that the prevalence of such short terms has a tendency to affect injuriously the character of houses built under them. We are, however, unable to say that a similar result ensues in the case of longer terms, such as ninety-nine years, except in such instances as that of a man erecting a house for his own occupation, when he would be likely to spend more money on the building if he obtains a long term or the freehold.

We consider that the class and quality of the houses depend in the main on a number of conditions, such as the situation of the property, the class of dwellings for which there is a demand, the character and means of the builder, the amount of supervision exercised by the local authorities, and a variety of other circumstances, which are irrespective of tenure.

Your Committee are further of opinion that the state of maintenance and repair of houses mostly depends, not upon the tenure, but upon the character and position of the landlords, lessees, and occupiers; for although it is undoubtedly the case that a freehold occupier has a stronger motive to keep his property in order than the leaseholder, yet on the other hand there is the power and interest which the ground landlord has to enforce the covenants to repair contained in the lease.

A great deal has been said with reference to the condition of leasehold houses, tenanted chiefly by the working classes, held on the "fag ends" of leases—*i.e.*, on terms that have only a few years to run. In these cases it is alleged that houses commonly get into the hands of a class of middlemen whose object is to make the largest possible profit, getting the highest rent that can be obtained for them, and spending as little as they can help in maintenance and repairs. We have received but little specific evidence on this branch of the question, but opinions have been expressed by many of the witnesses that the bad state of repair of houses so held is attributable to the leasehold system. We think there is no doubt that the holder of the fag end of a lease has a strong interest not to spend more on the repairs of his house than he is positively obliged to do, and although in most cases the landlord has the legal power to compel repairs, yet there seem often to be great practical difficulties in the way of his doing so, besides which he is often merely waiting for the expiration of the lease to clear the site and rebuild. The local sanitary authorities also are naturally reluctant to exercise compulsory powers in respect to such houses, and to put the lessee to a large expense which he would have no time to recoup himself for during the remainder of his lease. For these reasons we think that the division of ownership existing under such circumstances conduces to the bad condition in which many of the dwellings occupied by the working classes in towns are found, and that it facilitates the operations of a low class of middlemen as landlords. It must, however, be remembered that all houses in the course of time wear out, and there is abundant evidence that freehold houses of a similar class to those referred to, are apt to get into an equally bad condition. This has been proved as regards London, and would, we think it probable, be found to be the case in most other towns, having a large population of the poorer classes. Property of this class, whether freehold or leasehold, tends to get into the hands of a class of speculators, who extort the highest rents they can obtain from the occupiers, and expend as little as they can in repairs, consistently with keeping the houses tenanted. We are of opinion that the principal remedy for such a state of things must be looked for in a rigid enforcement of sanitary powers by local authorities. We may also observe that the falling-in of the leases in the neighbourhood sometimes gives opportunity to a ground landlord to put an end, by rebuilding, to an unsatisfactory state of things which, in the case of a number of small freehold owners, might continue almost indefinitely. To the above observations we would add this qualification, that a working man building for himself on freehold land will probably spend more money on his house than if he held it on a lease, though, as the vast majority of houses are supplied to the community by builders, this observation is of limited application. We think a working man owning his house will probably feel a greater interest in its maintenance, and will, therefore, in most cases, keep it in better order and condition if it is his own freehold than where he only possesses a limited or terminable interest.

Many of the cases where property held on the leasehold system is in a very bad condition are cases where the property is held under old leases, which do not reserve sufficient powers to the lessors to prevent encroachments by building, and to enforce a proper state of repair. As regards high-class residential property the evidence tends to show that it is built equally well on leasehold as on freehold. Illustrations of this are given in reference to estates in Birmingham, Liverpool, Nottingham, and the West-end of London. The same remark would apply to the state of maintenance and repair of such property."

We have given this part of the Report at length, because it is in our view perhaps the most important part.

There are one or two subsidiary points which have yet to be touched on before we arrive at the question of the enfranchisement of leaseholds. One of these is as regards the laying out of estates for building, which the

advocates of the leasehold system urge is best done when this tenure is in use. It is sufficient to give the conclusion of the Committee without further comment.

"The Committee, while acknowledging the advantages of building land being dealt with on a consistent plan, and as a whole, and the good effect which a far-seeing freeholder will exercise over the development of his property on the leasehold system, have no evidence to lead them to believe that building land is not equally well laid out and developed in the large towns where the freehold system is prevalent, and the evil apprehended from every man building according to his own plan on his own freehold are, in the opinion of the Committee, to be met by the supervision of the local authorities, who should have ample power to ensure both good building and the proper laying out of the building land."

The rest of these subsidiary points relate to rebuilding, since it is alleged that the leasehold system, by providing that after a term of years the houses shall revert to the freeholder, encourages the periodical building of new houses. The conclusion of the Committee is very short:—"The Committee are of opinion that in most cases when a large area reverts at one time to the ground landlord this circumstance facilitates and promotes the improvement and rebuilding of houses in such areas." This is not altogether a finding in favour of the leasehold system, since it is obvious that a house which it is advisable to pull down after it has been in existence for eighty or ninety years cannot in the first instance have been very substantially built. On the other hand, when houses have increased, of course this opportunity for rebuilding and altering the class of houses is of value and importance.

We now pass to the subject of leasehold enfranchisement. The report of the Committee on this much-debated subject is of a temperate character, but it necessarily follows that, as they have come to the conclusion that the leasehold system is not as bad as its enemies would have us believe, the necessity for leasehold enfranchisement cannot be as urgent as its advocates contend. We will first of all give the conclusion arrived at by the Committee, which is as follows:—

"While we are unable, for the reasons we have above stated, to recommend the adoption of any general scheme of compulsory leasehold enfranchisement such as those which have been proposed to us, we are of opinion that there are places where some plan for facilitating the acquisition by leaseholders of the freehold of their houses might with advantage be put into operation as regards limited areas, in which there are a large proportion of occupying leaseholders of the industrial classes (including clerks and small traders) who are able and willing to purchase the reversion of their properties. No proposal for such a local application of the principle of the enfranchisement has been laid before us, but a consideration, on the one hand, of the disadvantages of the existing state of things, which are undoubtedly very strongly and generally felt in some localities, and, on the other hand, of the injury and disturbance of rights which would, we believe, ensue from any scheme of universal application, such as suggested, leads us to the belief that the best practical solution of the important question of how to enable the classes above-mentioned to become more generally owners of their houses, is likely to be found in the exercise by local bodies of powers to be conferred upon them under certain defined circumstances. For instance, if it should appear that there are areas occupied exclusively, or very largely by the dwellings of these classes, where the majority of the occupiers are leaseholders and are desirous of purchasing the freehold of their houses, and if in such cases the local authorities should be of opinion that habits of thrift and industry would be promoted, and the prosperity of the district enhanced by enfranchisement, and should have reasonable grounds for believing that the powers to be conferred upon them could be exercised without loss, we think the local authority might properly be empowered to acquire by agreement, or, if necessary, by compulsory purchase, the reversionary interests in the property within the area in question, and to sell the reversions of their houses to such of the occupying leaseholders as had agreed to enfranchise, either at a price paid down at once, or payable in instalments over a period of years. The part of the property not so disposed of the authority should be empowered either to sell (subject to the right of pre-emption to the original owner being reserved) by public auction or by public tender, or to retain at its discretion. It might be proper that the exercise of these powers on the part of the local authority should be preceded by an inquiry under the direction of the Local Government Board.

Although we are conscious that there are many objections which may be made to this plan, and that difficulties would probably attend its practical operation, yet we consider that it would be free from some of the gravest objections which, in our judgment, attach to any enfranchisement scheme indiscriminately applied to the whole country. It would greatly diminish, if not entirely remove, the risk of subjecting the owners of ground rents and reversions to the constant liability to the piecemeal purchase of their property; it would greatly reduce the difficulties arising in connexion with compensation for severance, and the costs both of ascertaining the interests of the freeholders and other reversioners, and of investigating their titles; and it may be assumed that optional powers of the kind described would not be put in force, to the detriment of the community, by interfering with the interests, either present or prospective, of municipal corporations or public charities.

The application of a process of the kind proposed would also be gradual, and, to some extent, tentative, and would, in our opinion, be likely to afford valuable evidence upon the prevalence among the the industrial classes of a desire to purchase the freehold of their houses, upon their ability to do so, and upon other questions connected with this branch of our inquiry, which are at present largely matters of speculation.

The Committee, therefore, recommend to Parliament the adoption of a measure for empowering local authorities to facilitate enfranchisement in the manner already described."

The reasons for this very cold recommendation of leasehold enfranchisement are obvious when the portions of the report anterior to this conclusion are studied. These we will briefly summarise. The Committee are of opinion that the leasehold enfranchisement "would not materially benefit the working-classes in London and in most large towns," because they are usually lodgers or occupiers as weekly tenants or on tenures too short to bring them within its scope. In other places, such as Woolwich, and in some of the mining districts of Wales "there is a strong and bonâ-fide desire on the part of the working population to acquire the freehold." The value of such a desire in encouraging thrift is cordially recognised by the Committee, and it is to meet the case of communities where the desire is general that a practical measure of leasehold enfranchisement is recommended. On the other hand the Committee equally recognise the injury which may be done to reversionary interests and to thrifty men, "persons of moderate means and retired tradespeople" who have invested their savings in ground-rents if any wholesale measure of leasehold enfranchisement were to become law. Again also the Committee find equal difficulty in ascertaining any fair mode of compensating reversioners by fixed tables, and they desire to put on record their "decided opinion that it is essential as a matter of common fairness that the reversioners shall receive the full value of their interest in the property, compensation for injury which they may suffer in respect of adjoining and other property, and all the costs necessarily incurred."

We have now given our readers the main points of the report, so far as they relate to England and Wales. There are some comparatively minor recommendations of some value to enable trustees of places of worship, co-operative societies, and public authorities, to become owners in fee of leasehold sites. These are based on principles long familiar in the case of railway undertakings and similar enterprises. On the whole, the report is likely to lead to some useful and unsensational legislation. It will be a long-standing barrier in the way of any wholesale scheme of leasehold enfranchisement, and it has shown that many of the complaints against the leasehold system are unfounded.

University of Glasgow.—The Chair of Civil Engineering and Mechanics in the University of Glasgow, in the gift of the Crown, is about to become vacant by the retirement of Professor James Thomson, C.E., LL.D., D.Sc., F.R.S., whose health has been failing of late. Professor Thomson, who has held the appointment since 1873, formerly occupied one of the Chairs in Queen's College, Belfast.

CONCRETE FLOORS.—II.*

BY FRANK CAWS, ARCHITECT.

AS before noted, the behaviour of glass window-panes very well illustrates the behaviour of cement concrete. The behaviour of cast-iron is likewise very similar to that of concrete. The reason for this similarity appears to lie in the fact that the compressional strength of each of the three materials is largely in excess of the tensional strength; being, for cast-iron, about 7 to 1, for neat cement about 10 to 1, and for glass about 11 to 1. For cement-concrete the proportion of compressional to tensional strength will vary according to the nature and relative quantity of the aggregate. The concrete for floors, mixed as before described, is a much tougher or softer material than pure cement, and immensely tougher or softer than glass; that is to say, much less brittle, softer, and more flexible. Probably the compressive strength of such concrete is about eight times its tensile strength, as remarked in Part I. The principle appears to be universal that, all other things being equal, the most inflexible materials are those whose compressive strength most exceeds their tensile strength, and the most flexible materials are those whose tensile strength most exceeds their compressive strength. Thus glass, with 11 of compressive to 1 of tensile strength, is very much more brittle than cement concrete, with 8 of compressive to 1 of tensile strength; though the actual strength of glass is about twenty times that of cement-concrete in tension. The marvellous difference between the toughness or softness of the concrete and of the glass is shown by the fact that concrete can be cut with a chisel, while glass can only be cut by a diamond.

But, notwithstanding the great difference between the flexibility of cement-concrete and of glass, as already suggested, the likeness between the behaviour of window panes and of concrete floor slabs affords a valuable index to the real strength of the latter. No practical builder would hesitate to put in window-panes 1 ft. square of ordinary sheet glass $\frac{1}{10}$ in. thick (*i.e.*, 21 oz. per super. foot) to withstand the heaviest wind pressure,—of, say, 84 lb. per foot; nor would he hesitate probably to make that same pane of glass serve as the floor of a parlour aquarium to sustain 16 in. depth of sea-water,—*i.e.*, about 84 lb. per foot load. We know that shop windows of plate-glass from 8 ft. to 12 ft. square by not exceeding $\frac{1}{4}$ in. thick (and generally of less thickness), safely sustain, as a rule, the pressure of the heaviest storms of wind encountered in the streets, reaching an occasional maximum, probably, of about 42 lb. per foot. [Of course, it may be said the glass has not, when so set on edge, to bear the leverage of its own weight, as it would have to do if laid flat. But its own weight would only represent a very small fraction of the total load, when 84 lb. per foot wind-pressure was at work,—about $3\frac{1}{2}$ per cent., in fact.] And when, as rarely happens, shop windows are blown in, the weakness proves oftener to lie in the imperfect bedding and fixing than in the glass itself. The tensile strength of sheet glass of good ordinary quality is about five times that of matured neat cement, and about twenty times that of matured cement concrete, mixed one of best Portland cement to four of good, hard, well-burnt brick aggregate.

The strength of slabs is inverse to their breadth or diameter, and is as the square of their thickness.

If the glass pane, 1 ft. square by $\frac{1}{10}$ in. thick, had possessed only $\frac{1}{20}$ of its strength we should set it to carry a pressure, not of 84 lb., but of $\frac{84}{20}$, equal, say, 4 lb. per ft. And if it were 1 in. thick it would carry 100 times as much, because 10^2 equal 100.

Thus we may theoretically adopt as a unit base of calculation for the strength of concrete slabs (subject to an ample allowance for practical contingencies), a slab 1 ft. square by 1 in. thick, carrying 400 lb. safely, equally

See p. 16, ante.

TOWER FOR ST. JOHN THE BAPTIST CHURCH, WIMBLEDON.—Mr. T. G. Jackson, M.A., Architect.

distributed, all the four edges of slab being well bedded on an unyielding foundation.

If now we make the slab ten times as large, while keeping it still 1 in. thick, we shall have a slab of 10 ft. square by 1 in. thick sustaining a safe load of 40 lb. per foot. If we increase the thickness from 1 in. to 4 in. we shall increase the strength sixteenfold, thus making the safe load 640 lb. per ft.

Thus we ascertain that a slab of concrete of matured strength, mixed in proportions four to one, as before described, if about 171½ ft. square by 6 in. thick, will sustain an equally-distributed load of 84 lb. per square foot, including its own weight of, say, 60 lb. per square foot, as safely as a 21 oz. window-pane, 1 ft. square, will sustain a hurricane pressure of 84 lb. per foot.

Constructionists who refuse to believe concrete-floor slabs of vast size are capable of carrying their own weight and heavy loads, overlook the fact that glass slabs, so to speak, in shop windows are commonly found exhibiting a degree of strength much more remarkable than that of a concrete slab 171½ ft. square by 6 in. thick.

The enormous difference between the resistance to flexure of a slab bedded on all its edges and a beam bedded only on its two ends, though of the utmost practical importance, appears to have escaped the notice of writers and compilers of constructional literature.

In proof of the enormous difference referred to, the following very homely experiment will suffice.

Take any rectangular picture on a cardboard mount,—say, for example, an ordinary *carte-de-visite*, out of its frame; and, having first removed the glass, place the frame, face downwards, flat upon the table, and lay across the narrower way of the frame the *carte*, letting its two ends rest on the frame, thus constituting the *carte* a *beam, pro tem.* Now place a threepennybit on the middle of carte, and upon that a sixpence, then a shilling, and then a pile of coppers, building up the latter slowly and carefully till the cardboard beam has deflected so far as just to touch the table in the middle of span. Now relieve the *carte* of weights, and, if it be fairly elastic, it will return to its normal flatness. Now replace the carte on the rebate of the frame, so that all its four edges are fairly bedded thereon, and repeat the experiment with the coins. The *carte* is no longer a *beam*, it is a SLAB now, and the heap of coins which caused the beam to deflect till touching surface of table, produce scarcely any visible effect on the slab. An enormous increase of load is necessary to cause the slab to yield to nearly such an extent as the beam; and when, under this vastly multiplied load, the slab eventually gives way, it is awkwardly creased or crinkled and crippled, in a totally different manner from the beam flexure, and its elasticity will not restore the slab to flatness, when once it has been so crippled and crinkled. It will be found that at least sixteen times the load is needed to produce the same deflection of slab as of beam. Again, as a final experiment, if the *carte*, without being crippled or bent beyond its elastic power of recovery, is not only allowed to rest on its four edges, but is also pinned, or gummed, or otherwise well fastened down to those edges (*encastré*, in fact), then the experimenter will find a very considerable further increase of resistance to flexure has been thus obtained; probably, in most cases, about 50 per cent. additional stiffness to that of the slab at first described.

The laws of stress and strain pay as much respect to, and are as much respected by, the humble *carte-de-visite*, as to and by the mammoth bridges and roofs of the most ambitious engineering; and the wise student will learn no less from the common than from the rare examples accessible to his investigation.

The more deeply acquainted the constructor becomes with the nature of cement concrete, and with the manner of stress and strain to which it is liable, the more strongly will he be convinced that it is neither the dead load nor the rolling load; but the force of expansion initially, and (in certain exceptional cases only) the force of impact eventually, which he has special need to consider and guard against.

We have already seen that the force of expansion can not only be prevented from injuring the slab, but can be utilised in compressing and increasing the density and strength of the slab, simply by securing inflexible centreing, and also by keeping that centreing at least five weeks, and as much longer as practicable, in position after the slab is cast. We have also seen that the injurious momentum of mass, induced by sudden removal of centreing, can be obviated by using wedges, and slowly relieving the centreing of pressure.

But, when all has thus been done that can be done to obtain a slab free from expansion-cracks or flaws, another enemy to the endurance of the floor *may* (?) have to be confronted in the shape of impact.

A rolling load (if not jerkily rolling) is not impactive, but is simply equivalent, in its effect on the floor, to twice the force of the same load statically applied. The force of an impactive load is governed, not only by the weight of the falling body and by its velocity, but also by the degree of yielding of the two surfaces brought into contact.

A universal law, for which no better name can be found than the *Acceleration of Elasticity*, decrees the exact duration of yield of every elastic body under dynamic stress. This duration is determined by the measure of deflection due to the weight in question, acting statically on the body in question. For example, let it be supposed that a weight of, say, 10 tons, resting on the middle of a concrete slab, has caused a static deflection of, say, ⅛ in., from which, say, the slab will fully recover if that 10 tons weight be taken off.

If now, instead of applying the ten tons statically, we place it on the slab, and suddenly allow the slab to assume its pressure; that is to say, if we apply the ten tons dynamically, without any initial velocity or impact, the slab will, under that dynamic force, deflect ¼ in.; it will not, however, remain so deflected, but will oscillate or vibrate up and down at decreasing amplitudes, until, finally, it will come to rest at the static deflection of ⅛ in.

Now, the time occupied in that first dynamic deflection of ¼ in. is determined by the law above referred to, as the *Acceleration of Elasticity*. The time is, in the example before us, the time of one beat of a pendulum ⅛ in. long; because the law is, that a pendulum whose length equals the static deflection has a beat equal to the period of dynamic deflection. The period of pendulums varies as $\sqrt{\text{length}}$; and, as a pendulum 39 in. (=312 eighths of inches) long beats once every second, the time of ¼ in. deflection of the slab under notice will be=

$$\frac{\sqrt{1 \text{ eighth}}}{\sqrt{312 \text{ eighths}}} \text{ second} = 0{\cdot}0566 \text{ second.}$$

Thus the force of gravity of the 10 tons load will have achieved its maximum result on the slab deflection in 0·0566 second. It does this when the 10 tons weight starts to descend from the normal level of the slab. The same weight of 10 tons will always achieve its maximum result or the full slab deflection in 0·0566 seconds from first moment of contact, no matter what the level from which it starts to descend, and irrespective of the measure of slab-deflection its impact causes.

The accelerative force of the 10 tons in motion is determined by the duration of the accelerative motion. Thus if, instead of starting from normal level of slab, and enjoying 0·0566 second of resisted acceleration, the 10 tons were to start from a height 16 ft. above the normal level of the slab, it would then enjoy one second of free acceleration plus 0·0566 second of resisted acceleration. The accelerated force is measured by its duration solely; and, whether resisted or unresisted, the accelerative force of the 10 tons lasting, or operating, through a period of 1·0566 seconds, is as much in excess of the same force acting only 0·0566 second as 1·0566 exceeds 0·0566. Thus, in the example before us, the impact of 10 tons, falling 16 ft. on to the slab, would exceed the dynamic stress of 10 tons weight without impact as 1·0566 exceeds 0·0566, *i.e.*, as 18⅔ exceeds 1. So the impact of 10 tons in the example before us is to the static weight or dead weight of 10 tons as 37⅓ to 1.

And inasmuch as (within the elastic limits of the slab's endurance) the deflection will vary in simple ratio to the accelerative force, the slab, in the example cited, in order to resist the impact of ten tons falling sixteen feet, would need an elastic endurance permitting of a deflection of 37⅓ by ⅛ in., equal to 4⅔ in., which, of course, no concrete slab of ordinary dimensions could possess.

If, instead of a static deflection of ⅛ in., the slab showed a greater static deflection, the impact would be less severe. But, on the other hand, if the static deflection were less than ⅛ in., the impact would be more severe, the measure of severity varying in inverse ratio to the $\sqrt{\text{deflection}}$.

Thus it will be understood that the virtue of the extreme inflexibility of concrete floors renders the force of impact upon them peculiarly severe.

When all other things are equal, the larger the slab in proportion to its thickness the less severe will be the impact on its centre. In any case the impact will be more severe from a weight falling on or near the solid bearings of the slab than from a weight falling on or near the centre. A pavement slab on *terra-firma*, if bedded on unyielding rock, would be shivered by impact of a falling weight more easily than if bedded on yielding clay or mud.

This question of impact, however (important as it is scientifically, and also practically important in the construction of fortifications), has little, if any, practical importance in floors of dwellings, warehouses, and public buildings. There was a case in which some masons accidentally let a large mass of stone fall upon a concrete floor, near the summit of a building in course of erection; and the impact shattered the upper floor first, and every lower floor in succession. An accident of this kind does not, however, argue for rendering concrete floors proof against extraordinary impact. Every floor should be designed for the work it has to do; and no architect is reasonably called on to render his concrete floors proof against extraordinary impact, any more than he is called on to render the roof or vaulting of his church-nave proof against the impact of a falling spire struck down by lightning. So far as the writer is aware, in no case of ordinary roughest warehouse work has impact been known to shatter a well-made concrete slab. And, ordinarily, there is no need to provide against it. The packing-cases generally knock themselves to pieces, and so the floor is saved.

The window-panes of houses, to say nothing of shops, are greatly more liable to be broken by impact than the concrete floors of warehouses. We do not on this account divide the house and shop windows by iron bars into exceedingly small panes; but if we did so, the effect would be, not to prevent impact from shattering the glass, but to localise the injury, and prevent it extending across the entire window. So, undoubtedly, by dividing concrete floors of great area into small squares by means of iron girders, we should not prevent impact from cracking the floor, but we should confine each crack to its own small square. But, seeing that concrete floors never are cracked by impact, is it worth while to incur the great expense of these iron girders, when they are of no use except to localise the effects of impact? It is a practical question, involving economy.

The case of Hayward's, Hyatt's, and other pavement lights may be adduced as practical evidence that there is wisdom in sub-dividing the squares into small areas. But are we then to conclude that, because Hayward, Hyatt, and others employ 6 in. by 6 in. lenses ¼ in. thick, therefore, we should make our concrete floors in 10 ft. squares 15 in. thick?

The writer knows of a floor 10 ft. square by 4 in. thick, and an ugly hole cut out of one corner to allow of a spiral stairway; also of an extensive series of floors to a warehouse with many slabs 22 ft. by 12½ ft. by 13 in. thick; also of a crowded footpath on a public bridge where the self-sustained slabs are about 6 ft. square by 3 in. thick; and nothing like an impactive crack has manifested itself in either of these cases. Glass is undoubtedly more brittle than cement concrete. That is to say, the deflection of a slab of glass ¾ in. thick under its final load within its limit of tenacity would be less (considerably less) than the deflection of a slab of cement of same size and thickness under its final load at point of cracking. Hence impact on glass is more severe than on cement, and the pavement lights are made thick to suit. The briquette of neat cement is again much more brittle than the block of cement concrete. Indeed, the toughness of cement concrete is most remarkable, and involves a measure of comparative flexibility which renders the impactive stress on cement concrete much less severe than on neat cement, and still less than on glass.

To sum up;—the outcome of the foregoing considerations seems to be, that it is an economical mistake to make concrete floors of spans so small as in common use,—for concrete is capable of much higher endurance than it is generally believed to possess; and if a small part of the extravagant sums which are now wasted on iron girders, and on obstructive metal columns, were expended in procuring old, well-seasoned cement, and in erecting and maintaining inflexible centering, the result would be more satisfactory, especially to the proprietor and to the Fire Insurance Companies. For, all other things being equal, it is certain the less of iron used in a "fire-proof" structure, the more really fire-proof it is. If a large quantity of very inflammable stock were stored in a warehouse with roof, walls, and floors of concrete, without any iron anywhere, certainly the heat of the burning stock *might* cause such expansion of the large slabs and masses of concrete as to crack it in all directions. But even under the most unfavourable conditions it may be taken for granted that, for all practical uses, the warehouse would be as available with its cracks as without; and rarely, if ever, would the building be so injured by the fire as to require reconstructing.

These are some of the conclusions of many years' experience; and it would, perhaps, be well if others would publish their experience of concrete floors, &c.; for the subject has been by no means over discussed, or fully and finally dealt with, by the writers of this or preceding generations.

The question of economy of fireproof construction is a much larger question than at first sight would appear. It is not merely the question whether the wholesale firm of Messrs. Peace & Plenty shall pay for iron girders and not get a fireproof result; it is not merely the greater question of whether fireproof construction generally shall continue to be discredited and placed at a discount by reason of the non-fireproof character of those structures where iron has been so unsparingly and unwisely employed. Wooden houses were thought good enough before the great fire of London. After that fire, wooden roofs and floors were still permitted, though wooden walls were disallowed. This was only a half step in civilisation; and, up to the present time, our improvements stop far short of finality. Is it not true that in 1889 we still regard a fireproof building as a luxury? The great firms and the personal property and archives are to be secured from the devouring flame. But the more sacred and precious lives of the people are still to be risked nightly with nothing but the fire-engine and fire-escape as an alternative. Yet it is a fact that not only walls, but also roofs and floors of the dwellings of the people, can be constructed more strongly and quite as cheaply in fireproof as in a non-fireproof material. Here is the great field for economical and sensible employment of cement concrete. But so long as ignorant mistrust of the strength of concrete is accompanied by extravagant employment of iron, and by presumptuously soon and sudden removals of centreing carelessly erected, so long will the great and urgently needed improvement be arrested or hindered.

The great advances in the manufacture of Portland cement during the present decade have so cheapened and improved the material as to bring it more and more to the front. And, just as iron and steel have displaced timber from the shipbuilding-yards, so will Portland cement displace it from the building of houses (except as mere centreing) when once the public get to understand that fireproof dwellings can be built as cheaply as the ordinary non-fireproof house or cottage.

F. C.

NOTES.

ANOTHER association has been formed for the defence of the trading public against the railway companies and their new classification proposals. It is to be hoped that such bodies will not become too numerous, and frustrate the purpose of their existence by clashing with each other, and confusing the Board of Trade with conflicting opinions. Certainly, the new association,—according to the terms of the resolution which created it,—sets out with the best of intentions, viz.:—"For the purpose of furthering concerted common action on such points as are of common interest, together with such other representative bodies and traders as may signify their desire to co-operate." This was the outcome of a large meeting presided over by the Lord Mayor on the 26th ult., and attended by a number of merchants and others, including several M.P.'s. The leading idea seemed to be that traders were wasting energy in carrying out the suggestion of the Board of Trade by attempting to come to agreement with the railway companies, and that the principle of "union is strength" had not been sufficiently recognised. That this principle has guided the Association in the appointment of a committee for the furtherance of its objects may be judged from its composition, for, in addition to numerous representatives of existing bodies, a member of each of the County Councils is to be included. The intention of the association is to urge the Board of Trade "to invite the aid of a commission of experts, with the object of assisting in the preparation of a classification on a fairer basis." If this appeal is successful, of course all the negotiation of the past, based upon the classifications already submitted, has been so much time wasted. Whatever may be effected by the new movement, we can but repeat the hope that it will not result in more unprofitable delay.

AS the Post Office Sites Bill has passed a second reading, by a vote (173 to 57) which seems in curious contrast to the strong opposition to it in debate, it may be presumed that the Post Office will now have the site placed at their disposal in some form or other. The Bill is referred to a Select Committee, and we hope the Committee will keep in mind the public interests in regard to light and air and enjoyment, so far at least as to make it a condition that all the ground not absolutely required for Post Office buildings should be kept open and laid out as a public garden or square. There must be plenty of room for that on the site, and if properly done the new buildings required might even be made an addition to the effect of the site—but we fear that is the very last consideration that would enter into the minds of either the Committee, the Office of Works, or the Post Office authorities.

IT was officially intimated, at last Tuesday's meeting of the London County Council, that Mr. Gordon, who was lately elected Chief Engineer, will enter upon his duties in London (by the courtesy of the Corporation of Leicester) at the beginning of September. It will be quite evident, from a glance at our report of what was said at the same meeting of the Council, in the discussion of the Report of the Main Drainage Committee, that Mr. Gordon has very important work before him. According to statements made by more than one speaker, the existing sewage pumping stations are quite inadequate for their work, and the new precipitation works at the Barking Outfall, about to be opened, will produce three times as much sludge as the two sludge-ships can carry away! These are serious statements to be made after the expenditure of millions of money. Of course the County Council is not responsible: these works were bequeathed to it by its predecessor, the Metropolitan Board of Works. We have on several occasions hinted our strong doubts as to the permanent efficacy of the methods adopted by the late Board, at such heavy cost, for the treatment of the London sewage at the outfalls. We notice that Mr. Beal has on the agenda-paper of the Council the following important notice of motion, which is calculated to raise the whole question:—

"That it be an instruction to the Main Drainage Committee, so soon as the Engineer enters upon his duties, to engage an engineer of high eminence (in concert with the Finance Committee) to join with him in an inquiry, and to report on the condition of the Northern and Southern Outfall Sewers, as to the general condition of the Thames at the outfall points, and to confer with the Engineer of the Thames Conservancy, and to report on the necessity (if any) of further extension of outfalls (north and south), as to the best means of dealing on the evidence with the great question of removal of London sewage, and the probable cost of a complete and efficient scheme to purify the river; to remove the sewage and carry out what was designed by the Act of 1855 to meet the needs of London for the next fifty years; the financial operations incident thereto to be extended over eighty years."

Whether this is likely to be carried we do not know, but we see that Mr. Rhodes, the Chairman of the Main Drainage Committee, will attempt to meet it by moving, as an amendment, "the previous question,"—*i.e.*, that the question be not now voted upon. We saw it stated in print the other day by Mr. Rhodes that he intended to take this course because he was quite satisfied, from personal examination, that the new outfall works at Barking would be successful in meeting their intention. We shall see. We do not know what special qualifications Mr. Rhodes has for forming so decided an opinion upon so technical a subject,—nor, we must confess, do we understand why he was appointed Chairman of the Main Drainage Committee,—one of the most important committees of the Council. His reports, and his explanations when he is questioned in the Council, certainly do not convey the impression that he is quite "the right man in the right place."

THE last number of the *Wiener Bauindustrie Zeitung* gives a series of very well-executed illustrations of recent street mansions in Vienna, which we may presume represent the architectural taste and tendency of Vienna at the present moment. One cannot say very much for it, except that the buildings illustrated seem all to be very well-executed and in a handsome and costly manner. Symmetry and a certain dignity they can boast of, but of artistic feeling there seems hardly a trace; all are cold formal *façades* in a commonplace Classic style with the most uninteresting type of *rococo* detail. The House of the "Gesellschaft Franco-Hongroise" in the Rudolfsplatz, designed by Herr Tietz, deserves the praise of dignity and of apparently a somewhat purer and more refined kind of detail than the other examples. The house built by the architect Herr Otto Wagner for himself, in the Stadiongasse, is also free from the reproach of *rococo*; it is a great square block with the lower two stories rusticated, and the next two treated with windows each framed within Roman Doric columns and entablature. In a house, 38 Heugasse, designed by Herr Andreas Streit, there is a rich and rather elegant treatment of the segmental projecting bay windows at each end of the *façade*: the bays being flanked by female figures at the re-entering

angle with the main wall at each side, stretching out their arms to hold festoons which are looped across the window heads. The figures are good, and generally it would appear that decorative sculpture introduced in modern Viennese buildings is well executed. But the architecture is of that type which may be called architecture *de luxe*, done to satisfy fashion rather than artistic sentiment. The monument to the poet Grillparzer, illustrated in the same journal, is very good in general conception, and appears to be good in detail also. It represents the statue of the poet seated in a niche under a pediment flanked by two coupled Corinthian columns on each side, the central composition being flanked by two curved wing-walls the height of the impost of the niche, carried round each way from the centre and stopped by square piers, the inner curve of the walls being divided into panels containing bas-reliefs of subjects from the poet's works. The monument is effectively relieved against a group of trees forming the background. The architectural design is by Herr Hasenauer; the figure by Professor Kundmann, and the bas-reliefs by Professor Rudolf Weyer.

A LIVELY discussion has been going on in the columns of *L'Architecture* between the advocates and opponents of the École des Beaux-Arts, or of the general idea of a scholastic education in architecture. The defenders of "l'École" affirm that every French architect who has done anything worth speaking of has been educated at the École; the opponents use the argument, *post hoc non propter hoc*, and that it would be just as reasonable to argue that all persons baptised entered into the world perfect Catholics, whatever might be their beliefs or disbeliefs in mature age. It is affirmed by the defenders that the Palace of the Champ de Mars is a "projet de l'École," to which M. Jourdain, the principal "free-lance" in the combat, replies:—

"Est-ce à l'Ecole qu'Hermant a étudié le Louis XV. de son élégant pavillon des pastellistes? Est-ce à l'Ecole que Gauthier a trouvé son exotique porte du quai d'Orsay? Est-ce à l'Ecole que Sauvestre a préparé son pittoresque palais des colonies? Est-ce à l'Ecole que Ballu, Marquette et Saladin ont documenté leurs pavillons algérien et tunisien? Cette question forcément fastidieuse, je vous la poserai à peu près pour toutes les constructions de l'Exposition. Et n'allez pas me répondre que c'est en réédifiant à satiété ces abominables villas italiennes, dont la moins horrible ne vaut pas le dernier manoir normand, que nos confrères ont appris ce qu'ils savent, car il n'y a pas le plus éloigné cousinage entre la villa Madama, par exemple, et les adorables intérieurs de Versailles."

This is the old controversy in very full swing indeed, it will be seen. M. Dupuis, who upholds the "École" standard, puts the other side of the question rather well in the following paragraph, urging the importance of systematic training on the basis of the central styles of architecture:—

"Lorsque le novice saura composer, mettre en proportions un plan, coupe, élévation; qu'il connaîtra la décoration en général par l'étude sérieuse, réfléchie des grands maîtres de l'antiquité; qu'il aura jeté son feu, que son imagination aura été modérée, tempérée par les leçons des maîtres; à ce moment seulement tirez de votre tiroir le double décimètre, le Code, le Manuel des lois du bâtiment et autres éteignoirs, et faites comprendre à l'élève le module général. En trois mois le jeune homme sera mis au pas de la vie pratique et ses études classiques, idéales (si vous le voulez), l'auront formé et lui permettront, suivant son tempérament, d'exécuter sinon du grand art, tout au moins de produire des œuvres de goût et de bon arrangement architectural. De grâce, ne prônes pas les petits côtés de l'histoire, ne parlez pas tout de suite dans l'enseignement: du gaz, de l'électricité, du téléphone, du tout à l'égout et autres engeances modernes qui sont loin d'être poétiques, qui n'élèvent ni l'âme ni le cœur de l'artiste."

The concluding portion of the correspondence is headed "Triomphe de l'École"; so we presume that the director of *l'Architecture*, at all events, thinks that the "Ecolists" have the best of it.

MOST people will commend a wish which Lord Rosebery expressed when replying to Mr. Joseph Beck's address upon the opening, last week, of Clissold Park,—that he trusted the guardians of the park would be wise enough to leave Nature to her own devices there. It is largely due to the exertions of Mr. Beck, the Chairman of the Preservation Committee, that so beautiful an enclosure is secured for public enjoyment. We have already given a brief history of the property*, which the Ecclesiastical Commissioners offered for sale five years ago. In the interval, the purchase-moneys, amounting to 96,045*l.* 10s. 6d., were contributed by various public bodies: 25,000*l.* by the late Metropolitan Board of Works, 10,000*l.* by St. Mary, Stoke Newington, 6,000*l.* by South Hornsey, 5,000*l.* by St. John, Hackney, 2,500*l.* by St. Mary, Islington, Vestries, and 47,500*l.* by the Charity Commissioners from out of certain funds rendered available by the London Parochial Charities Act, 1883. Though the laying-out of the land is far from completed, we are enabled to say that the principal entrance will be at the old lodge, opposite to the new parish church (the late Sir G. G. Scott, architect), whence a broad path will bend towards the New River, and there be divided into two others. Of these, one passes before the not very imposing house, despite its western colonnade, and so, upon a raised causeway, by the trees along the river's left bank. The other path will lead across a bridge to the portion, being about one-third of the whole 53 acres, known as the "Horse-shoe," which includes some of the best trees. Two other bridges will afford access to within the curve of the river, from the Paradise-row and Highbury New Park gates. The raising of the "Horse-shoe" mound, no longer marked by its oak-tree, will prove an advantage, since the park is generally flat, and much of it lies lower than the river's level. It is proposed to call the new elevation "Fat Turkey-hill," in allusion to the terms of the old lease by the chapter of St. Paul's, whereby the rental was fixed at 10*l.* and a fat turkey yearly. Care will be taken to encourage the settlement and breeding of wild fowl on the lake islands.

IN connexion with the Loch Katrine Waterworks, the piercing of the first of the new water-tunnels included in Glasgow's water-supply enlargement scheme has just been completed. It is the most southerly of the series, commencing at Strathblane, about ten miles to the north of Glasgow, and ending at the outfall into Mugdock and Craigmaddie service reservoirs (the latter now in course of construction), one mile and three quarters farther to the south, that being the distance to which the new or second Mugdock Tunnel, as it is called, extends. Boring commenced about midsummer, 1886, from either end, and continued steadily by constant relays of shifts up to October of last year, when bad ventilation in the northern drift, and hindrances due to excessive inroads of water there, induced the engineers to confine work to the southern face, and that has been the rule ever since. The junction of the bores in the centre of the hill proved to be most successful, hardly even the smallest fraction of divergence showing itself. Four years was the estimate at the time Messrs. Morrison & Mason entered upon the contract, fully three of these having thus been consumed; but, although the piercing is accomplished, there is still a considerable amount of interior dressing to be overtaken. Much of the drift is through good rock, chiefly whinstone, and requiring no additional support; but there are several insecure intervals of soft, or otherwise unreliable, strata, and these will have to be lined with concrete. The floor also will be bedded throughout with the same material, on a system which will reduce the friction of the current to a minimum, and enable the new tunnel to pass daily, in addition to the increase arising from the larger bore measurements, a much greater proportionate volume of water than is at present within the capacity of the original tunnel. It is expected that the new work will deliver at a rate a good one-third in excess of the present maximum. The estimate for this particular section of the work, which forms a contract by itself, is 40,000*l.* The other contracts to the north, between this point and Loch Katrine, a distance of twenty-four miles in all, are for the most part well under way, the additional tunnelling amounting to about ten miles, and the remainder consisting of level surface aqueduct work and syphoning.

* Vide the *Builder*, February 26, 1887.

AMONG the buildings grouped about the neighbourhood of the Eiffel Tower at the Paris Exhibition are two *façades* in very ancient styles of architecture, but exceedingly modern in their contents. One, in the similitude of an ancient Egyptian temple front, contains the Suez Canal Company's exhibit, which includes a large model of the Canal, a number of photographs, a model of the illuminated buoys that are used to mark the channel in certain places, and a spirited statue of a woman carving the name and date of the enterprise on a rock, for the French have a way of getting sculpture even into practical exhibitions of this kind. The other is the much larger pavilion of the Mexican State, built in the likeness of an ancient Mexican temple, with its immense rusticated basement, and its characteristic steep steps (about 2 of riser to 1 of tread) between the pylons below the central entrance. The public are not invited to enter by these steps (which could only have been used by a barefooted society), but at lower "practicable" doors at the side. The object of most interest is the admirable model of Captain Eads's ship railway for cutting the Isthmus of Panama knot. The *modus operandi* as illustrated here is as follows: a ship to be transported on to the railway is brought into a large dock the bed of which is laid with a slope upward from deep water to ground-level. Along the margin of the shallow side of this dock is a platform on wheels, and with a number of hydraulic presses working upward through the floor. The rolling cradle which is to carry the ship is wheeled on to the rails laid along this platform and firmly fixed to it, and the whole platform then descends sideways into the dock by gravitation (controlled by hydraulic power), running down on wheels working on rails laid on the sloping bottom of the dock. Arrived into deep water, the ship is floated over and adjusted centrally over the backbone of the cradle, the platform is slowly drawn up, and when the ship begins to bear on the cradle, the hydraulic presses on the floor of the platform are put in action, by one uniform pressure, and as they rise they push upwards a set of corresponding vertical jacks in the bed of the cradle, each of which rises until it clips the portion of the hull immediately over it. The platform then rises to its original position, the jacks are fixed at their respective heights by a simple mechanical means, and the cradle is ready to begin its journey along the railway, the rails of which correspond with the rails of the platform when in its original position by the dock. As the many-wheeled cradle could not turn curves, the line would be laid in perfectly straight sections connected by immense turntables, the ship being pulled round on these by two of the locomotives which do the rest of the haulage, and which now shunt on to a circular track laid round the turntable. Mechanically, and apart from special conditions of site, the whole thing seems very practicable, and at all events the model is worth seeing.

THE Brussels architectural journal, *L'Emulation*, devotes an article in its last number to the subject of theatre archæology, on which there is no doubt much to be said, mostly in the direction of criticism. The Belgian journal is severe on the anachronisms of the Brussels Opera-house, where, we are told, in the last performance of "Romeo and Juliet," decorations from the Villa Medici of 1546, and the Ducal Palace of 1577, were introduced in the first scene of an action supposed to take place at Verona about 1300; while in "Hamlet" the king and nobles in costumes of the thirteenth century walked

in and out of buildings in the style of the seventeenth century. The perception of archæological correctness of costume generally precedes that of architectural correctness in cases of this kind. In the leading London theatres there is now a laudable attempt at a general indication of architecture of the supposed date of the action; but it is very seldom carried out correctly in regard to minor details.

IN *The Antiquary* for August, Mr. E. W. Cox gives an interesting account of the old Ashton Manor House in Lancashire, with one or two sketches. The House is one of great interest and very picturesque character, especially noticeable for the peculiar buttress-like turrets at the angles. It is stated that the Manchester, Sheffield, and Lincolnshire Railway Company, whose line runs a little way from the Manor House, are applying for powers for a compulsory sale in order to build a new warehouse there. It is not very likely that this can be the only available spot for what the company require, and it is to be hoped their demand will not be granted. It is of course useless to make any kind of appeal to a railway company to leave alone an old house which is an interesting relic of the life and history of a once-important mediæval family. Managers of railway companies seem to be so constituted intellectually that they would probably rather pull down an ancient house than take an unencumbered site.

THE increasing habit on the part of architects of advertising their names and addresses on notice-boards affixed to buildings which they are superintending is one which all those who care about the honour and dignity of the architectural profession ought to do their best to oppose and put a stop to. Some of those who put out these tradesmen's advertisements, of course, are mere hangers-on at the skirts of the profession; but it is done by others who ought to know better and to have more sense of dignity and professional propriety. Shaftesbury-avenue contains a whole series of these boards giving the name and address of the architect in staring capitals; sometimes, we regret to observe, with the affix "F.R.I.B.A." There is no other liberal profession in which this kind of thing would be done. What would be thought if, when straw laid down in the street gives the outward sign of a serious case of illness, a board were fixed up on the house with the notice—"Case attended by Dr. Forceps, 200, Harley-street"? We venture to think that if any medical man were so regardless of his own dignity as to do this, he would very soon find public opinion within his own profession too strong for him. And why does not public opinion within the architectural profession put down this vulgar and undignified form of touting? We should like to know what the Council of the Institute of Architects think of members of the Institute who degrade the status of the profession in that way? And if they do think pretty strongly about it (as we should imagine), will they tell these advertising gentlemen what they think?

The Architectural Association. — A meeting for the formation of a new class in connexion with the Association,—viz., the Class for Sketching and Measuring-up Buildings in London and the neighbourhood,—was held at No. 9, Conduit-street, on Monday, July 22, Mr. Leonard Stokes, the President of the Association, presiding. There was a good attendance, and several rules were framed. A very strong list of Visitors was drawn up, which includes the following names:—Messrs. Leonard Stokes, F. R. Farrow, F. T. Baggallay, Millard, W. G. B. Lewis, A. B. Pite, McLaren, Collard, Marvin, Hooper, Cresswell, Horsley, Simpson, A. B. Mitchell, T. G. Hart, and C. H. Lohr, to be submitted with the rules to the Committee of the Association. It is proposed to make fortnightly visits on Saturdays, when vacation visits do not take place. The first visit will probably take place on Saturday, August 10. Mr. A. W. Earle was elected Secretary, to whom all communications should be addressed at 44, Mortimer-street, W.

LETTER FROM PARIS.

WE gave in our last letter the list of the medals of honour conferred on French and foreign painters by the International Jury of Fine Arts. We now give a list of the first medals adjudged by the same jury to England and France.

England:—Sir Frederick Leighton, Messrs. Burne-Jones, Herkomer, Hook, Orchardson, Whistler, Forbes, Leader, Reid, Shannon.

France: Messrs. F. Barrias, Benjamin Constant, John Lewis Brown, Jean Béraud, Ferrier, Fourrier, Friant, Humbert, Le Blant, Émile Levy, Luminais, Maignant, Merson, Montenard, Pélouse, Raffaelli, Rajon, Renouf, Rixens, Tony Robert-Fleury, Tattegrain, Tissot, Vayson, De Vuillefroy, Wencker, Zuber, Blanc, Glaize, Madame Demont-Breton, Adrian Demont, Bondin, Émile Breton, Santay, Dubufe, Meissonnier *fils*, Pointelin, Hanoteau, Zacquet, Saintin, Adan, Dantan, Mathey, Damoye, Yon, Gilbert, Binet, Ehrmann, Courtois, Dawant, Aublet, H. Martin, Luigi Loir, Baudouin, Marec, Barillot, Gœuneutte, H. Pille, Lépine.

As space fails us for the list of other rewards, we will content ourselves with saying that Messrs. Fildes, A. Gow, F. Gregory, Waterhouse, C. Hunter, S. Knight, James Sant, and Stone have obtained second medals; Messrs. Aumonier, Beadle, Calderon, Fisher, Kennington, Macbeth, Morris, Murray, Stokes, Wyllie, Charlton, Crofts, Goodall, Rivière, Smythe, Starr, and Woods, third medals.

In sculpture, medals of honour have been decreed to Mr. Gilbert and Sir F. Leighton for England; and to MM. Mercié, Barrias, Dalou, Ingalbert, Roty, Noël, Turcan, Peinte, Lanson, and Carlès, for France.

It must be remembered, however, to avoid misunderstanding, that all the awards by the juries of special groups have to be ratified by the superior jury of twenty-one members.

As usual, there are plenty of malcontents and disappointed people in reference to these awards, and the newspapers have published complaints and protestations, and even refusals to accept the medals on the part of a certain number of artists who have a higher idea of their own talent than that held by the jury. These demonstrations of wounded *amour-propre* are unworthy of art. How many artists of real genius have patiently waited for years for an official recognition of their merit which, after all, could add nothing to their reputation? We need not go further back than the Exhibition of 1867, when M. Puvis de Chavannes accepted graciously the Third-class Medal which had been contemptuously refused by MM. Debat Ponsan and Léon Comerre. But these are quarrels which are only interesting to the self-interested, and about which we need say no more here. The only solution of the difficulty would be to suppress altogether these recompenses, which are the objects merely of ambitious vanity, to the detriment of the dignity of art.

We may give, however, some of the official honours which have been awarded on the occasion of the National Fête of July 14th, which is always a special opportunity for distributing recognitions of this kind. M. Jules Coutan, designer of the monumental fountain in the central garden of the Champ de Mars, has received the Cross of the Legion of Honour, as also M. Walwein, architect of the Pavilion of the Ministry of War.* The Cross of Chevalier has been awarded to M. Blavette, architect, principal superintendent of the erection of the Galérie des Machines; to M. Gauthier, architect of the triumphal arch at the Pont d'Alma, and the monumental portal of the Esplanade des Invalides; to M. Saladin, architect of the Tunisian Palace; M. Gaston Hénard, principal superintending architect of the Palais des Arts Libéraux and Beaux Arts; M. Marcel Lambert, architect "des bâtiments civils" and to the works at the Palace of Versailles; and M. Montel, revising architect for the general direction of works of the Exhibition.

We have, at all events, the satisfaction of finding that on this occasion the architects hold a conspicuous place in the honour-list. They are not generally in the way of being too much spoiled in this respect, and the awards have had the effect in this case of giving recognition to able collaborators in subordinate positions, who are too often overlooked and forgotten.

Inaugurations have been going on almost continuously for some time. After that of the small Bartholdi statue, of which we have already spoken, comes that of the statue of Raspail the chemist, who, as is well known, was a revolutionary *enragé*. This rather ponderous monument is the work of the two brothers Morice, to whom we owe the immense monument on the Place de la République. It has been erected at the angle of the Boulevard Raspail and the Boulevard Edgar Quinet. M. Léopold Morice designed and modelled the statue of Raspail, the two bas-reliefs on the pedestal being the work of M. Charles Morice.

Some days later took place the inauguration of the monument to Admiral Coligny, erected in a small, silent, melancholy square near the chevet of the Temple de l'Oratoire of the Louvre, and a few yards from the spot where Coligny was assassinated by order of Charles IX. This monument, of which we have before had occasion to speak, stands 10·60 mètres high. It was executed after the designs of M. Scellier de Gisors, architect. The surbase, mounted on three steps, is in white marble. On each side of the *fronton* which crowns the surbase, in a tomb form, are seated two figures also in white marble, which as well as the principal statue, are the work of M. Crauk. The figure on the right represents "la Patrie" holding a drawn sword and a crown; that on the right "la Religion" holding a palm. In the middle, on a pedestal of grey granite, is the statue of Coligny, in white marble, of which an illustration has appeared in the *Builder*. An open Bible is placed before the pedestal, which is framed between two columns of pierre de Lorraine supporting an entablature which is decorated with the Coligny coat of arms between two Renaissance vases. The architect and sculptor may be congratulated on having produced a monument of dignified and suitable character and wrought out with much refinement of style.

On the 15th of July there took place also the inauguration of the Bourse de Commerce, built by M. Blondel on the site of the old "Halle aux blés," the cupola of which alone has been utilised. Some days afterwards the opening took place of two charitable establishments founded by foreign benefactors: the "Fondation Rossini" and the "Maison de Retraite" of the brothers Galignani. The first has been built in a corner of the fine park of the "Asile de Ste Perine" at Auteuil; the second on the Boulevard Bineau at Neuilly; and both have been built under the supervision of the architects of the "Administration de l'Assistance Publique."

The latest official ceremony has been the opening of new Zoological Galleries, and the new Conservatory of the Natural History Department, at the Jardin des Plantes. The new Zoological Pavilion is in two sections. On the façade towards the Garden, two galleries run the whole length of the building; behind is a large hall, 55 m. long by 25 m. wide, with aisles 8 mètres wide, repeated on the two upper stories. This building, the exterior façade of which offers a certain degree of sober decorative effect, in a good style, is the design of M. André, member of the Institute, and who has just received the cross of the Legion of Honour.

A monument to Condorcet, to be eventually erected on the quay opposite to that on which stands the statue of Voltaire, is at present the object of a public competition; and there will shortly be erected the group intended to commemorate Alfred de Musset; a monument offered to the Municipality by a rich citizen, M. Osiris, who has commissioned MM. Falguière and Mercié to execute the figures. The monument is to be erected in the centre of the "bassin" in front of the Church of St. Augustine, Rue Malesherbes. It should be added, however, that a separate statue to the poet is to be erected by "la Jeunesse Française," which M. Granet has been commissioned to execute.

The scaffolding which long hid the mosaic cupola of the escalier Daru, at the Louvre, has at last been removed. This cupola, elliptical in form, was commenced five years ago from the designs of M. Guillaume. Dedicated to "the Renaissance," it is decorated in the pendentives with four large figures on a blue ground, symbolising Italy, France, Flanders, and Germany. Above, on a large frieze, winged genii, relieved on a gold ground, hold medallions with the portraits in cameo of Raphael, Poussin, Rubens, and Dürer. The principal figures, the winged genii, and the medallions are all executed from the cartoons of M. Lenepveu, in the national atelier of mosaic under the direc-

* Illustrated in our last number.

tion of M. Vannutelli, a distinguished mosaic artist in the service of the Vatican works, whose assistance has been placed at the disposal of the École des Beaux Arts.

The second cupola, situated above the "Victory of Samothrace," and which is to be consecrated to "Antiquity," will include figures of Egypt, Assyria, Greece and Rome. These two latter figures are already partly executed.

At the Panthéon, under the direction of the architect, M. le Deschault, the final preparations have been completed for the translation to that building of the remains of Carnot, Marceau, Latour d'Auvergne, and Baudin; the ceremony of reception being fixed for the 4th of August. On the same day, the President is to lay the first stone of a monument which is to be erected in the Panthéon to the memory of Hoche and Kleber. It is to be placed at the extremity of the right-hand transept, the pictorial decoration of which was long ago assigned to MM. Théodore Maillot, Joseph Blanc, and Henri Lévy. Advantage is to be taken of the occasion to destroy the immense heap of funeral wreaths which has accumulated in the crypt of the Panthéon since the interment of Victor Hugo.

Though it is unnecessary to speak here of the numerous *fêtes* which have succeeded one another at Paris in honour of the centenary of the Revolution and of the Exhibition, mention may be made of those which took place at the Palais de l'Industrie on the 10th and 13th of July, and which necessitated the luxurious furnishing of the edifice, and its transformation into a gigantic ballroom capable of containing 60,000 visitors. The success of these *fêtes* did the greatest credit, once more, to M. Alphand's genius for scene-setting, and also to M. Thomas, the young architect under whose charge the Palais de l'Industrie is placed, who in this exceptional organisation, carried out in a few weeks and at a cost of 700,000 francs, gave striking proof of his ability and good taste.

At one of its recent sittings the Municipal Council voted funds for the acquisition of a certain number of works in painting and sculpture which were in the *Salon* of 1889. Among the pictures we may mention "l'Été" of M. Roll; and among the works of sculpture the fine "Chien Danois" in grey marble exhibited by M. Gardet. We pass over in silence the other purchases, which had little to justify them. But what is open to positive criticism is the choice of a third-rate artist to engrave the commemorative medal which is to be presented to M. Eiffel and all who have worked on his tower. Had they addressed themselves to M. Chaplain, M. Roty, or M. Daniel Dupuy (not to mention other lesser names), they would have had an interesting and well-executed design; as it is, the commonplace figure in contemplation before the tower is marked by neither taste nor originality nor excellence of execution.

We may add that the Municipal Council has recently been occupied in filling up the vacancies caused by death among the artists who are commissioned with the decorations of the Hôtel de Ville. M. Emile Lévy replaces Cabanel in the Salon des Caryatides, and the landscape which should have been executed by M. Lavieille has been entrusted to his pupil M. Berthelon.

At the École des Beaux-Arts they have just given the award on the competition for the Prix de Rome in painting. The subject was taken from the New Testament—"The Healing of the Paralytic." The "first grand prize" was accorded to M. Gaston Lhys, pupil of Messrs. Bonnat, Gustave Boulanger, and Olivier Merson; M. Ernest Laurent, pupil of Messrs. Lehmann, Hébert, and Merson, has obtained a "second first grand prize"; a "first second grand prize" has been awarded to M. Danguy, pupil of Messrs. Jules Lefebvre, Boulanger, and Gabriel Ferrier; and a "second second grand prize" to M. Charles Lenoir, pupil of Messrs. Bouguereau and Tony Robert-Fleury.

As regards the other competitions of the School, that of the second class, of which the subject was "A Restaurant," has produced the following results:—Out of forty-one designs sent in, the Jury of Architecture has given one first mention to M. Binet, pupil of M. André, and nineteen second mentions. In the competition of analytical elements, the subject for which was "A Chapel," out of eighty-three designs exhibited, the Jury has granted seventy-nine mentions; and finally, for the competition in sketches, for which the subject was "A Country House," out of thirty-one sketches exhibited, the Jury has given nineteen mentions.

We record with regret the death of two able artists, M. Louis Jules Etex, and M. Otto de Thoren. The former of these was a brother of the celebrated sculptor, who died last year, and a pupil of Lethières and Ingres. He began his career at the Salon of 1833, with some portraits which obtained a second medal, and his picture of "Adam and Eve" gained for him the same reward at the Salon of 1838. He painted a St. Philibert for the Church of Our Lady of Loretto, and various portraits for the Museum of Versailles, notably that of the Duke of Montmorency. M. Etex, who died at the age of seventy-nine, was also a Professor at the School of Decorative Arts.

The animal painter Otto von Thoren, who had lived in Paris for many years past, was born at Vienna. He obtained a medal in 1869 for two pictures which were much noticed: "Horse-stealers" and "Cattle-stealers." He obtained a second medal and the Cross of the Legion of Honour at the Salon of 1886, with his "Labour" and "The Refuge." He was a most conscientious artist, indefatigable in work, full of kindliness towards young painters, and highly esteemed for the dignity of his character and life. He had exhibited this year two pictures: "In Autumn" and "A Flock of Sheep"—a storm effect. He reckoned none but friends in the world of art, and was a member of the International Jury for Austria and Hungary. He died suddenly, on the day of the National Fête, at the age of 61 years.

P.S.—We may add, as a conclusion to this letter, that M. Charles Yriarte, the well-known art-critic, has just been nominated member of the Superior Council of Fine Arts, in the place of M. Eugéne Veron, deceased.

ARCHITECTURAL ASSOCIATION VACATION VISITS.

The fifth of these visits was made on Saturday last to Maidstone and Leeds Castle. As there are several architectural objects of interest in Maidstone itself, a whole day was devoted to the purpose. On arriving at the station, the members were met by Mr. Hurbert Bensted, F.R.I.B.A., who, being the A.A. Sketching-Club Consul for the district, had kindly consented to act as guide to Chillington Manor-house (now the Museum), the Palace, and the church. The members were particularly fortunate in obtaining Mr. Bensted's services, the restorations and additions to the Museum, as well as the work at the Palace, which has lately been acquired by the town, and utilised as a School of Art, &c., having been carried out by him, and he was, therefore, able to point out much that was of interest, and which only one who knew the buildings well would be acquainted with.

The Museum was the first place visited, a few piers and other fragments originally belonging to the Chapel of St. Faith being noticed, also the cloister under the long gallery of the Manor-house.

The nucleus of the present museum is the house built by Nicholas Barham, Sergeant-at-Law to Queen Elizabeth, and Recorder of Maidstone. The old house was used as a private dwelling until the death of Mr. Charles, in 1855, when it was purchased by the town, the late owner having bequeathed his pictures and archæological collection to the town.

In the interior of the house, besides many remains of the original structure, there are several objects of interest to the architectural student, as wood-carving, tiles, &c. In 1874 East Farleigh Court Lodge, being in a ruinous condition, but possessing some fine half-timbered work, was pulled down, and portions of it rebuilt adjoining the museum.

On leaving the Museum the old Palace of the Archbishops of Canterbury was visited. Maidstone was formerly a favourite place of residence of many Archbishops, and in 1348 Archbishop Ufford commenced a new palace, which his successor Simon Islip finished. Archbishop Courtenay died here. The building is in very good general preservation, although previous to its recent purchase by the town, it was used as two private houses, during which period much of the old work was hidden. The hall is now a good-sized room with oak panelling, and the old staircase still exists, but with signs of more than one alteration. Throughout the building are traces of alterations made at a comparatively early date, which leads Mr. Bensted to believe that the front wall, as it now stands, is some feet in advance of its original position. In this he is borne out by the evidence of the mouldings of the door jambs and string-courses which appear to be attempts to imitate earlier work, portions of which can be traced, though much weather-worn. In the garden are some vaulted outbuildings which evidently had an upper storey over them, there being traces of the external stair. There is also a doorway from the palace grounds to the adjoining church, which was not visited.

The present Church of All Saints was erected by Archbishop Courtenay, on the site of an earlier one, but the axis of the present church is not parallel to that of the original one, which was probably a smaller building. The Archbishop also gave to the church the college, or hospital for poor travellers, founded by Archbishop Boniface, in 1260, and erected the present college buildings and gateway shortly before his death, which occurred in 1396.

The first Principal of the College, John Wootton, who died in 1471, is buried in the south chancel aisle; his monument still retaining some very considerable remains of colour decoration.

After luncheon the party drove to Leeds Castle, where they were received by Mr. Wickham Martin, the brother of the late owner. The following outline history of the building may be of interest:—

About the year 857, Ethelbert being then King of Kent, a fortified camp was formed, probably on the largest island on which this castle now stands. Most authorities derive the name of Leeds from Ledian (or, as he is sometimes called, Led or Leddan), who was the King's counsellor and general, and is usually credited with the formation of the island stockade. Others, referring to the name "Esledes," by which it is known in the Doomsday survey, derive it from "Slades," meaning an open place in the woods; but it is probably only the two words "es Ledes"—of Led.

Be this as it may, it is certain that the Saxon camp was very shortly afterwards nearly destroyed by the Danes, and apparently was not restored until after the Conquest.

At the time of the Domesday Survey we find Leeds held (like many other places in this county) by Odo, and at his disgrace, shortly afterwards, William granted the manor to the Crevicœurs of Chartham, near Canterbury (which will be remembered by architects as possessing in its church some fine examples of Kentish window tracery), and referred to now because the chapel in the old castle (on the small island) had somewhat similar tracery placed in the windows in 1314 after the earlier work had been blown in by a hurricane—the old jambs being retained.

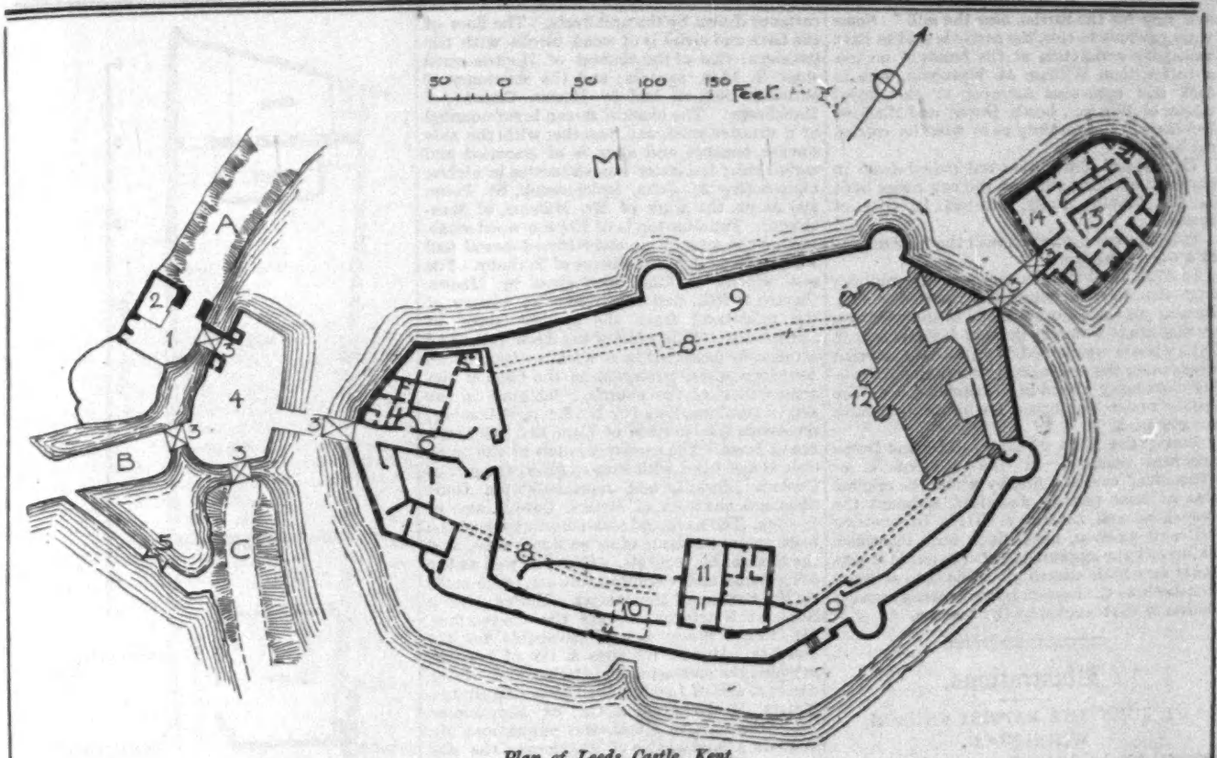
The Crevicœurs apparently kept possession to a certain extent until the time of Edward I., although we find the Earl of Gloucester seizing and attempting to hold it for Maud (or Matilda) against Stephen, by whom, however, it was taken.

After this we find the Crevicœurs again in possession, and mentioned in connexion with the Dover Castle guard, Leeds being one of the manors which had to supply a certain number of men for this purpose.

During the Barons' War, in the last years of Henry III., the Crevicœur, then holding Leeds, got into disgrace; and we find the castle in the hands of the Leybornes, from whom it passed (probably by compulsory exchange) to King Edward I.; but it is not at all clear how this came about, as we find that King, when he settled the castle on his Queen, Eleanor, and afterwards on his second wife, Margaret, obtained a confirmation from the then living Crevicœur. There is some reason to think that Sir Roger Leyborne (to whom it was granted by Henry III.) dying in 1271, his son, another Sir Roger, alienated it to the King on account of troublesome litigation with the contemporary Crevicœurs.

From the time of Edward I. to Henry VIII. it was a Royal domain, and frequently formed a portion of the dowry of successive queens. Edward gave it to Eleanor of Castile, and afterwards to his second wife.

Edward II. gave the castle to Lord Badlesmere (generally known and referred to as "the rich Lord Badlesmere") in exchange for other property. It is doubtful whether he had the right to do this, as the reversion belonged to his wife Isabella, who in 1321, during the absence of Lord Badlesmere with the Barons in the north, appeared one evening at Leeds, and,



Plan of Leeds Castle, Kent.

1. Outer Barbican.
2. Castle Mill.
3, 3, 3. Positions of original drawbridges.
4. Inner Barbican, through which, by opening the sluices, all using the roads, A, B, and C, were compelled to pass.
5. Sluices.
6. Gatehouse and Constable's quarters.
7. Inner Bailey.
8. Wall of enciente.
9. Outer Bailey.
10. Bath of Edward I.
11. Maidens' Tower.
12. Modern House.
13. Keep, or Old Castle.
14. Chapel.
M, M. M. Moat.

representing that she was on a pilgrimage to Canterbury, requested shelter for the night, but was refused admittance by the castellan, and on force being resorted to, was obliged to retreat.

The Queen, however, complained to Edward, who at once, by a writ dated Oct. 17, 1321, at the Tower of London, summoned the men of Kent, Sussex, Essex, Surrey, and Hampshire to meet him at Leeds. Lord Badlesmere attempted to treat with the King, but finding it useless did not even try to help the inmates of the castle, which was obliged to surrender. The castellan, Walter Colepeper, was hung, and Lady Badlesmere and family sent to the Tower.

In 1395 Richard II. was here, having settled the castle on his queen, Ann of Bohemia. He received Froissart, who in his history tells us that "the King was going to a beautiful palace in the county of Kent, called Leeds Castle." During the same visit the King issued the writs to the Chancellor of Oxford University to expel Lollards and to examine Wiclif's "Trinlogus." Shortly afterwards Richard was imprisoned here by Henry IV., who also settled the castle on his queen, and granted the use of it to Archbishop Arundel.

In 1425 Catharine of Valois was put in possession of Leeds, which she held till 1437. During this time the Curfew Bell was fixed. It is dated 1435, and has in low relief representations of "The Crufixion," "The Virgin and Child," and "St. George and the Dragon." About the same time the "Old Castle" assumed its present appearance, and possibly the Maiden's Tower was built, though some attribute that to Henry VIII.

Henry VIII. visited Leeds on his way to the Field of the Cloth of Gold, and during his stay in France fat bucks were sent over from the park here for the use of the Court. The castle seems to have been granted to Sir Henry Guldeford by Henry, and in 1632 passed by purchase to Lord Colepeper, but there is nothing to show whether he claimed descent from the unfortunate castellan who was hung here more than 300 years before. It next passed by marriage to the Fairfax family, the last direct descendant being General Martin, who inherited it in 1800. On his death he bequeathed it to his cousin Fiennes Wykeham, who curiously was a descendant of Sir Roger de Leyborne, who had held it 500 years before. Mr. Fiennes Wickham took the additional name of Martin, and the castle is still owned by the family.

Referring now more particularly to the structure itself:—The earliest part of the present buildings to which any definite date has been assigned is the chapel, which was built in 1280, a considerable amount of other work being carried out at the same time by Edward I. on the castle coming into his hands. It seems most probable that he had noticed how well adapted the place was for making a strong fortified position which should dominate the Weald of Kent, and so assist in protecting London from invaders attempting to gain access by means of the Kentish roads. Although the work of Edward is the earliest to which a date has been assigned, it has been made quite clear by frequent investigations that much of his work is built upon, or added to, work previously existing, and which still remains, although it is uncertain to what period it belongs.

Although Edward, therefore, devoted himself largely to the fortification of the castle, he yet paid some attention to the luxuries of a royal residence, for he constructed here one of the earliest examples of a swimming-bath, an appendage which he added to several of his houses. Probably he brought the idea from the East, or possibly baths were a luxury introduced by his queen, Eleanor of Castile, as we find the bath at Leeds particularly mentioned in the accounts kept by the executors of that queen.

As a specimen of military architecture and engineering it should be noticed that by means of sluices it was possible to flood the ground beyond the causeways on which the roads were formed, so compelling all using them to pass through the castle barbican, while a small watch-room near the guard-rooms was provided with look-out holes commanding each of the approaches.

There also seems some reason to believe that, to avoid the danger of the water of the lake, or moat, being poisoned by the enemy, spring-water was laid on from a spring nearly half-a-mile off, by means of a lead pipe, which is recorded to have needed repair in 1367, so it had evidently been constructed previously.

From a survey made in 1314 we learn that part of the wall of the inner barbican had slipped, and the jury appointed to examine it said they could not estimate the cost of repair without letting off the water from the moat to see the foundations. This would probably have been a difficult matter, as the barbican was purposely placed in the bed of the river Len, in order to prevent besiegers being able to cut off the water.

The arrangement of an outer and inner barbican is somewhat rare in English castles of this date, though found sometimes in France.

The castle buildings occupy three islands, the first being devoted to the inner barbican; the second to the gate-house, with guard-rooms and Constables' apartments, the inner and the outer bailey, and the lord's residence; while the third was occupied by the keep. All the islands were connected only by drawbridges, so that they could be separately defended.

The gate-house is probably of the time of Henry III. or John, but was raised by Edward I., and the machicolation probably added by Richard II.

The bath already referred to was apparently planned by Edward during a visit here in August, 1289, but it seems doubtful if it was ever used, as the Queen died the following year, and the king is not known to have visited Leeds since, although the work was, perhaps, carried on until 1291, as there is an entry in the account Rolls of a payment to Thomas of Lamberhurst "*for paving the bath of the King at Ledes.*"

The floor measured 22 ft. by 16 ft., and a centena of Reigate stone was purchased for the purpose. This may have been 100 stones 2 ft. square.

Turning now to the Gatehouse, after passing through the gate to the left was a vaulted cell with curious shaft, which seems to have been intended as chimney; or, as some think, a means of ventilation. A bench was also provided for the use of the guard and those waiting to see the Constable. On the upper floor were two guard-rooms, one for the privates and another for a superior rank, while in close proximity was the Constable's room, approached by a narrow passage as an additional means of defence. Communicating with the Constable's room was a "squint" to allow of his giving orders with regard to the drawbridge or portcullis without leaving his room. A small ante-room with look-out holes, commanding the three causeways and their approaches, was also provided.

Having just referred to the portcullis it may be of interest to notice that in January, 1386, we find that "Thomas Bromelegh, the Clerk of Works at Rochester Castle, delivered to William Okangre, Deputy of Sir John Devereux, Constable of Leeds Castle, two new portcullises with all needful ironwork and nails, and a new

iron ring for the barrier near the mill." Some years previous to this, the castle is said to have undergone restoration at the hands of no less a person than William of Wykeham, who in 1359 was appointed surveyor to the Royal castles of Windsor, Leeds, Dover, and Hadlow. But there is no certainty as to what he carried out here.

The original lord's house was pulled down in the reign of Elizabeth, and the new house built by the Smyth family, finished in time of James I.

This was only connected with the "old castle" by a wooden bridge.

In 1750 Lord Fairfax took out the mullions from the Smyth's house and inserted sashes. He also put sham Gothic heads to the windows, so that there was very little of interest left in 1822, when it was pulled down, and the present house built, the oak mantel from the old drawing-room being placed in the dining-room. The cellars under the house are probably twelfth century work.

During the reign of Charles II. some Dutch prisoners confined in the old castle, or "Gloriette," caused a fire, by which the original plan of that portion was lost, although the chapel, as well as Henry VIII.'s banquetting hall and kitchen, have since been identified. Externally the appearance of the castle is probably very little altered since the time of Queen Elizabeth, as the modern house is almost exactly similar to that erected by the Smyths.

Illustrations.

ST. JOHN THE BAPTIST CHURCH, WIMBLEDON.

THE body of the Church of St. John the Baptist at Wimbledon was built from Mr. T. G. Jackson's designs a few years ago, and it is now proposed to complete it by the addition of the tower and spire, which were omitted for want of funds. The church consists of a chancel with an organ-chamber on its north side, and a nave with a north aisle, and provides nearly 800 sittings.

Owing to the fall of the ground, height is obtained under the chancel for the vestry. The material is red brick, with stone dressings sparingly introduced, cut bricks being used for the moulded arches and jambs of doors and windows, both within and without the building. The pulpit and font are of marble; the chancel is paved with marble mosaic, and the chancel seats are of black walnut. The builder was Mr. Townsend, of Wimbledon; the marble work was done and the stalls made by Messrs. Farmer & Brindley, and the heating apparatus is by Messrs. Longden & Co.

EXAMPLES OF MEDIÆVAL WOOD-CARVING.

THE three examples from Wells Cathedral are probably of the fourteenth century, and are now, with a number of other interesting details, preserved in the Cathedral Library over the east walk of the cloister. The Miserere, from Coventry, is to be found at the back of the present choir stalls on the north side. David with his harp is still fairly perfect, but the majority of the figures have been very much mutilated, and Jesse himself has fared badly. New College Chapel stalls are in good preservation, and the examples given are only a few from a wonderful variety to be found there.

ST. PETER'S CHURCH, RUDDINGTON, NEAR NOTTINGHAM.

THE perspective view and small plan given will sufficiently show the design and arrangement of this church. The only part of the old church retained is the tower and spire; the latter was pulled down, a new belfry built upon the old tower, and then re-erected; the total height to the top of the spire is 116 ft. The materials used for the exterior walling is Coxbench stone; the interior is lined with stone from the Bath quarries. The roofs are covered with slates. An oak dado, 7 ft. high, surrounds the interior of the building. The nave roof is open timber work; that over the aisles and chancel is boarded and ribbed, the latter being decorated in colour with figures, nearly life-size, representing St. George, St. Uriel, St. Michael, and St. Raphael, surrounded by adoring angels and angels throwing incense, executed by Mr. Cantrill, of Manchester, from full-size cartoons drawn by the architects. The floor of the nave and aisles is of wood blocks, with tile passages; that of the chancel of Hopton-wood stone in 12 in. squares; and the sanctuary of encaustic tiles, all laid by Messrs. Conway, of Manchester. The chancel screen is surmounted by a massive cross, and, together with the side screens, benches, and altar, is of traceried and carved oak; the latter has statuettes in niches, representing St. John, Melchisedek, St. Peter, and Aaron, the work of Mr. Millsom, of Manchester. The altar-top is of Hopton-wood stone. Behind the altar is an embroidered dossal and wings, the work of the Sisters of Bethany. The east window is filled with glass by Messrs. Clayton & Bell, and represents the history of the priesthood from the earliest days of Christianity. This window has been fully and elaborately described in a work written by an American priest, published at the time of the consecration of the church. The glass in the side chancel windows (by Mr. Egan, of London) represents the Sacrifice of Cain and the Sacrifice of Isaac. The eastern window of the north aisle is also filled with stained glass, the gift of Captain Linskill, and represents the Good Shepherd, the work of Messrs. Powell, also of London. The nave and aisles are lit by fourteen brass spider pendants of seven lights each, and the chancel by brackets. These, as well as the other brass and wrought ironwork, were made by Mr. Powers, of Manchester. Messrs. Fish & Sons, of Nottingham, were the contractors, Mr. Henry Brown being responsible for the masonry. Messrs. Williams & Co. of London, supplied the casements and glazing, and Messrs. Stanton, also of London, the heating apparatus. Messrs. MacHamilton & Co., of Manchester, made the chancel screen and pulpit, and Mr. William Arbuckle, also of Manchester, the side screens, stalls, altar and nave panelling. Mr. Millsom executed the whole of the carving. Messrs. Bell & Roper, of Manchester, were the architects.

TOWN HALL, HOUNSLOW.

THE illustration shows the interior of the large hall, as proposed after alteration.

In addition to enlarging the hall, a new stage, with performers' retiring and ladies' and gentlemen's dressing-rooms, will be provided on the first floor, a new principal staircase and vestibule to serve the front part of the hall, and two new secondary staircases from the back opening directly to the street. A balcony is provided outside at the back of the stage with an iron step-ladder to garden, to form an emergency exit for the performers, and all the staircases will be fireproof. The stage is so arranged that by removing the partition at the back it can be doubled in size, if required for large theatrical performances.

On the ground-floor will be a new Board-room, 34 ft. by 24 ft., and gentlemen's lavatory and cloak-room, with a ladies' cloak-room in a mezzanine over it. The entrance-hall will be considerably enlarged, and the existing offices rearranged.

In the basement will be store-rooms for coals and other purposes, strong-room, and heating-chamber, with apparatus for warming the large hall.

For the ventilation of the hall, warmed fresh air will be admitted through coils of hot-water pipes placed below the windows, and the foul air will be drawn off at the top by means of sun-burners under the lantern-lights, with double tube extract shafts carried up through roof.

The work is now being carried out by Mr. Thos. Hiscock, of Hounslow. The architect is Mr. H. O. Cresswell.

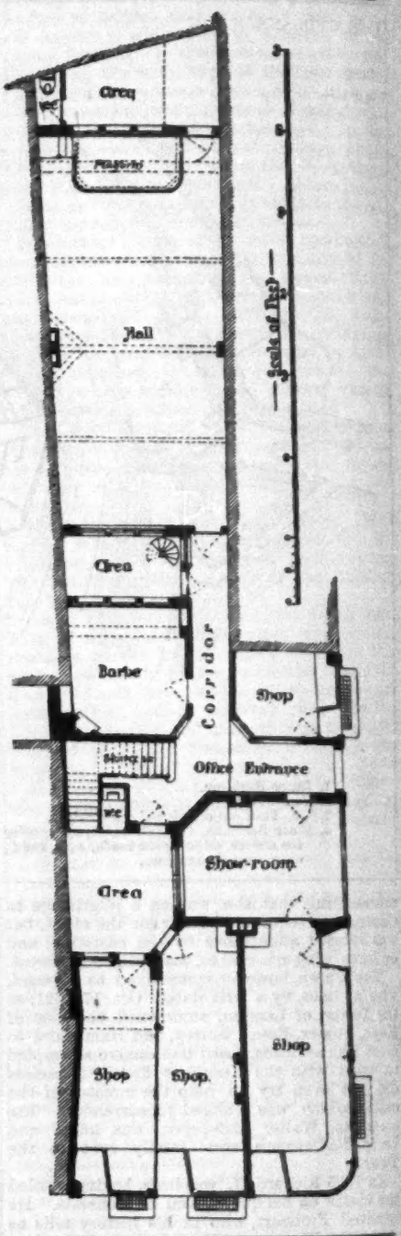
BUSINESS PREMISES, CARLISLE.

THE illustration represents a block of buildings in course of erection for Messrs. R. Moss & Co., Scotch-street, Carlisle. The building includes on the ground-floor a group of shops to the principal and side fronts, and a large hall in the rear.

The first and second floors of the front building are devoted to offices, which are arranged in suites, suitable for letting, each with separate lavatory accommodation, &c.

The elevations are being built of the warm red stone for which the quarries in the neighbourhood are famous.

The contracts for the work have been let separately,—all to local tradesmen,—the principal contractors being Mr. James Metcalfe and Mr. W. Batey, for the builder's and carpenter and joiner's work respectively. Mr. Geo. Dale Oliver, of Carlisle, is the architect under whose supervision the works are being carried into execution.



SCULPTURE: "JEANNE D'ARC."

THIS work, as already mentioned in our columns, is a second edition by the sculptor, M. Fremiet, of his equestrian statue of Joan of Arc, in which he has adopted a more robust and vigorous type of physiognomy for his heroine than in the former statue. The group occupied a central position in the great hall of the *Salon* exhibition of the present year.

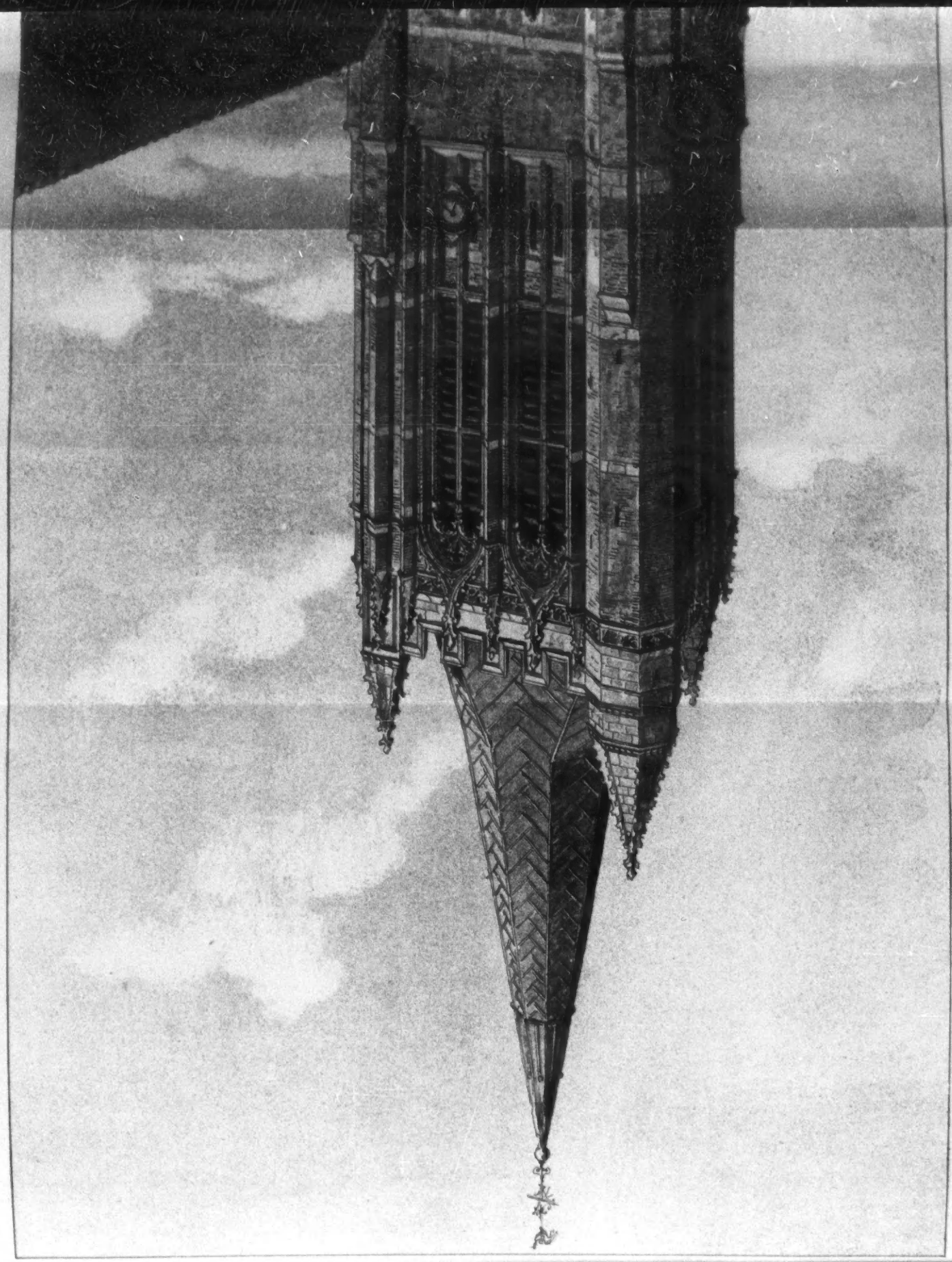
SCULPTURE: "EXILÉS."

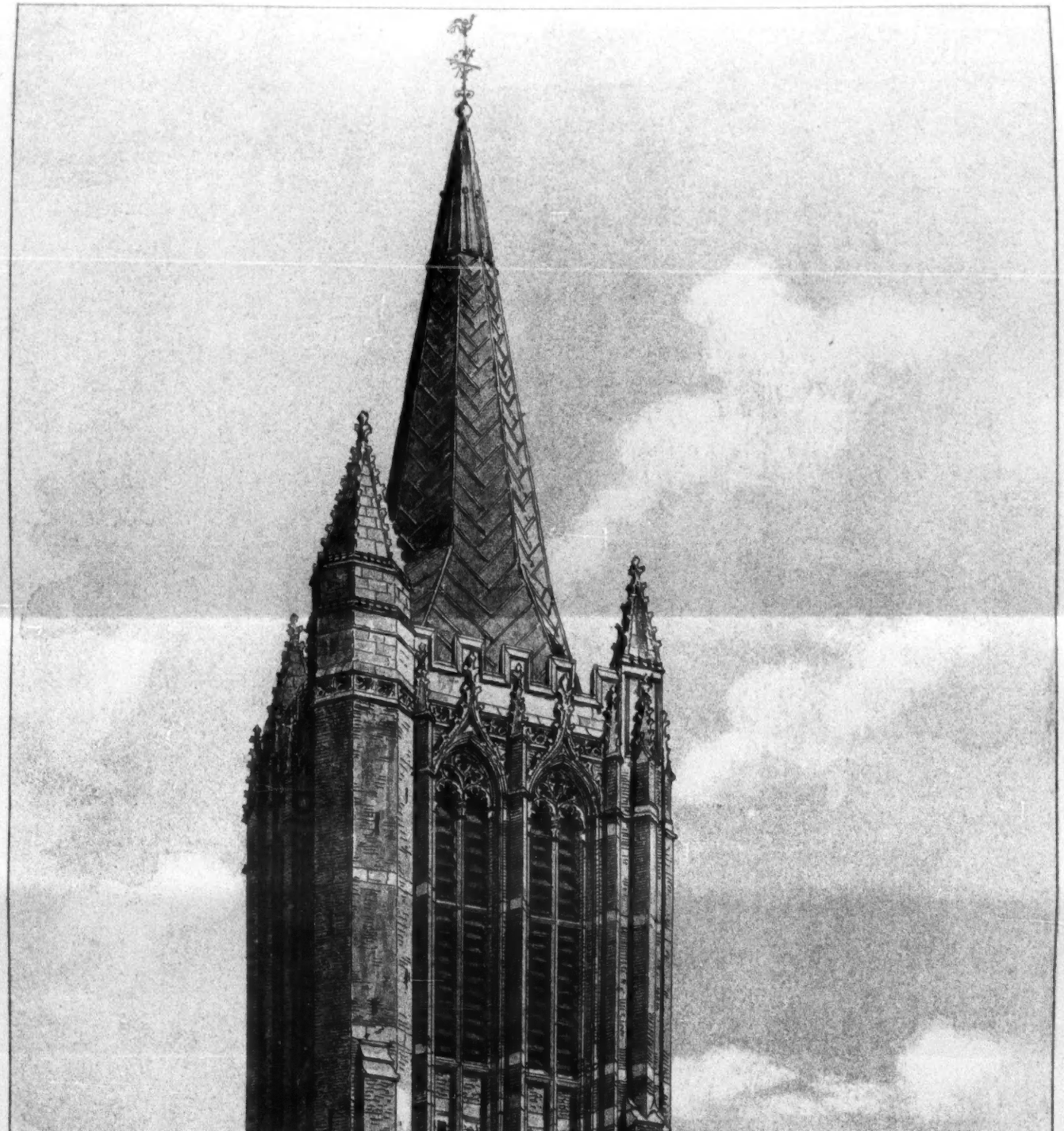
THIS fine group, by M. Mathurin-Moreau, was one of the most prominent works of sculpture in the Paris *Salon* of this year, and, as before mentioned, was considered likely to obtain the "Médaille d'Honneur" of the year, though this was not the ultimate decision of the jury.

A cast of the group also occupies a central position in the Sculpture Hall of the Paris Exhibition, and was specially referred to in our remarks on French art at the Paris Exhibition.

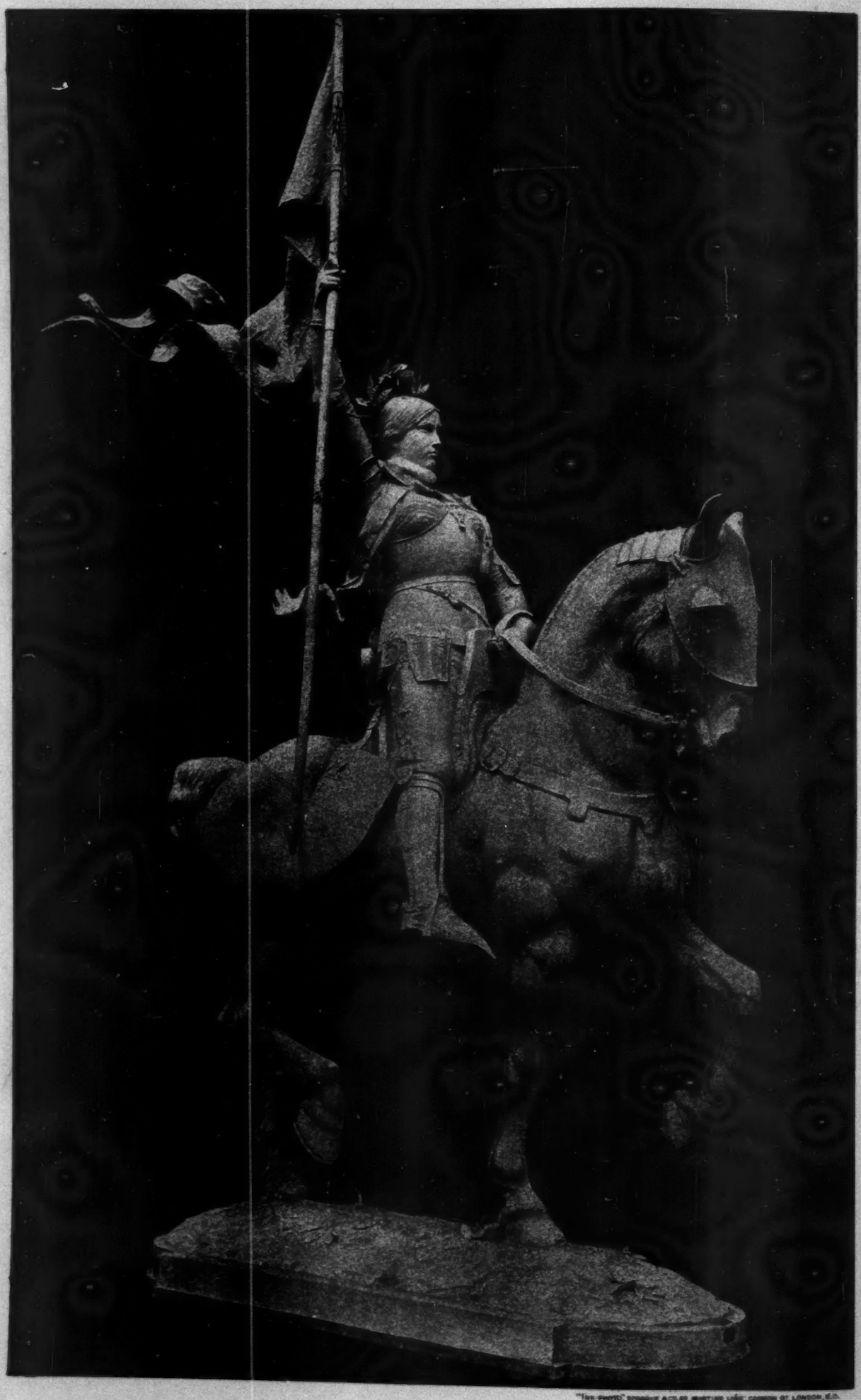
The British Archæological Association at Lincoln.—The British Archæological Association commenced its forth-sixth annual congress at Lincoln on Monday last. We have an illustrated report of the first two days' proceedings in type, but are obliged to hold it over until next week for want of space.

THE BUILDER, AUGUST 3, 1889.





TOWER FOR ST. JOHN THE BAPTIST CHURCH, WIMBLEDON.—Mr. T. G. Jackson, M.A., Architect.



SCULPTURE; "JEANNE D'ARC": EXHIBITED IN THE SALON OF 1889.—M. FREMIET, SCULPTOR.

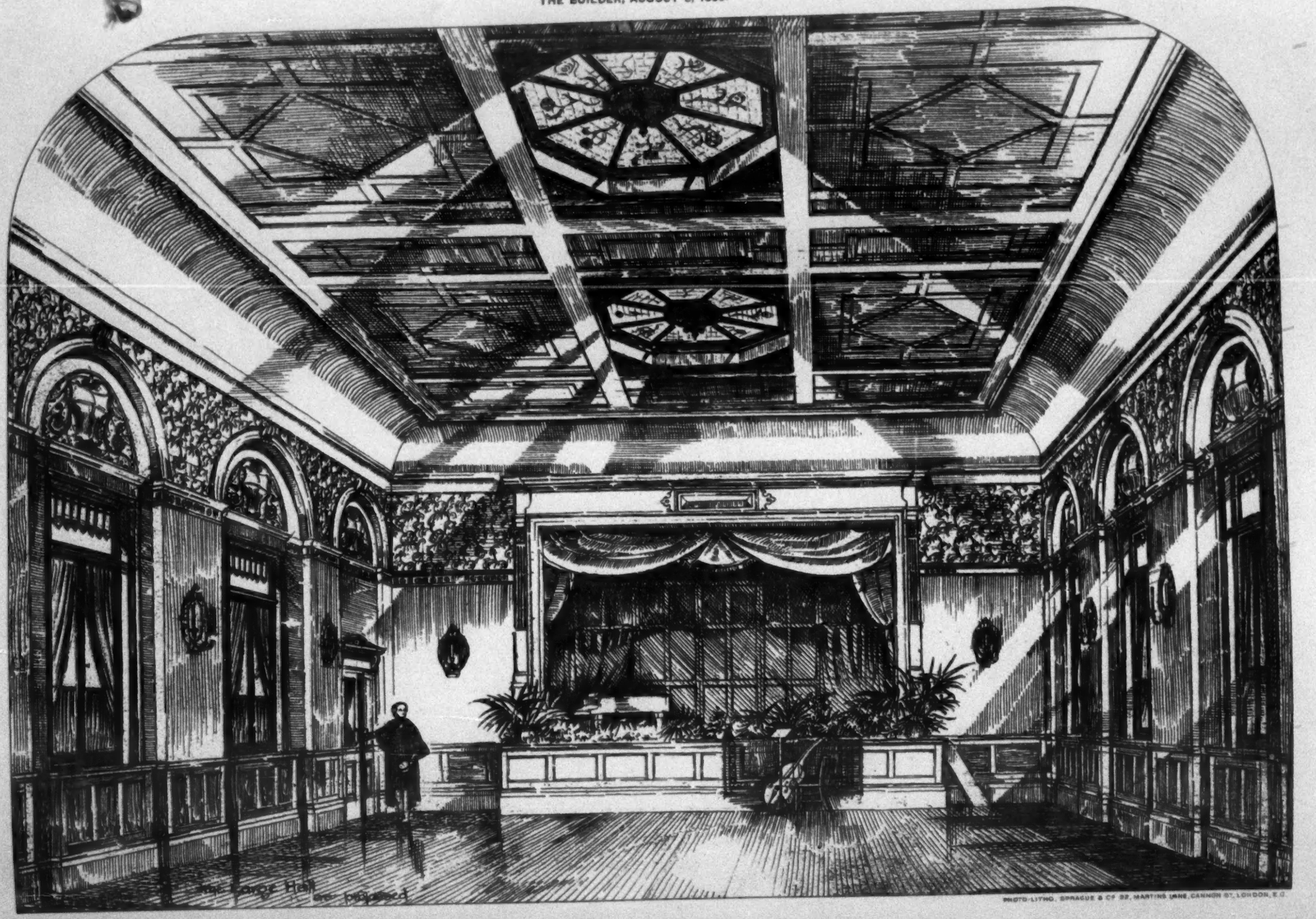
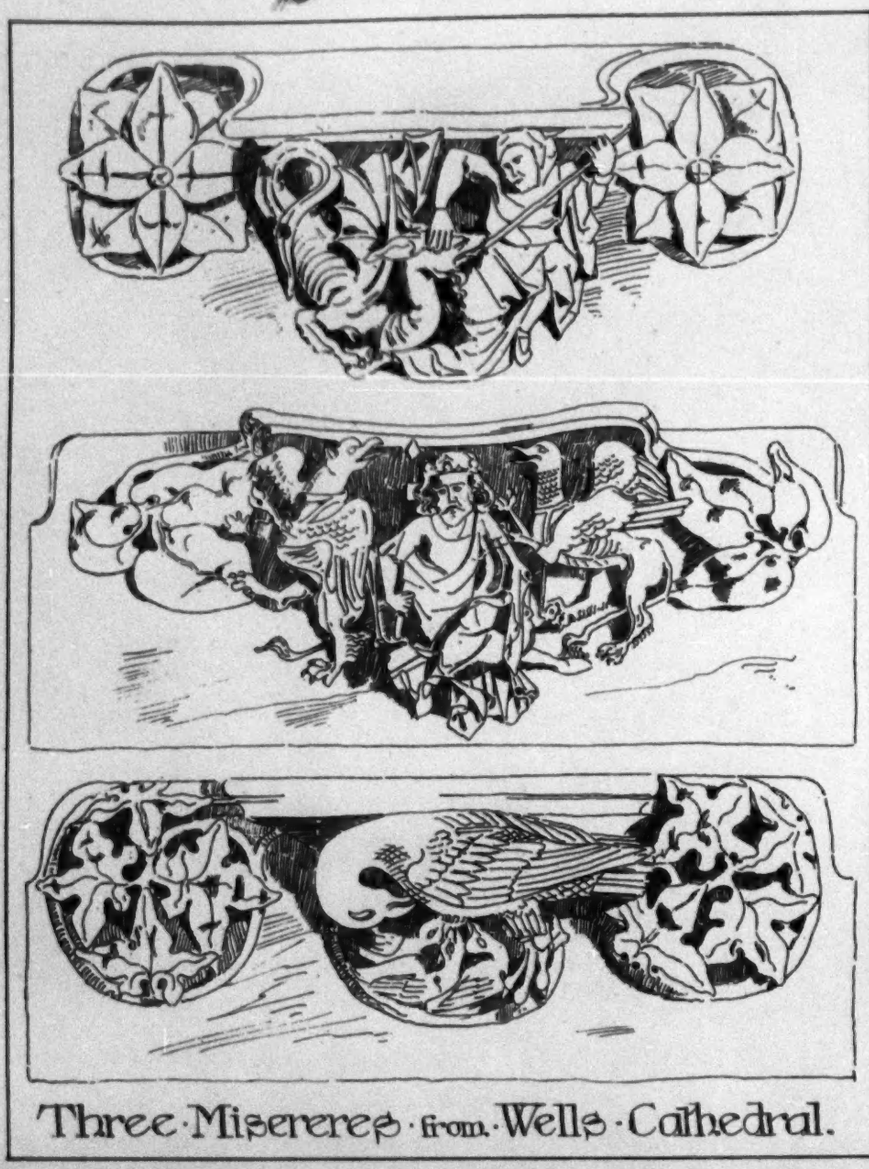


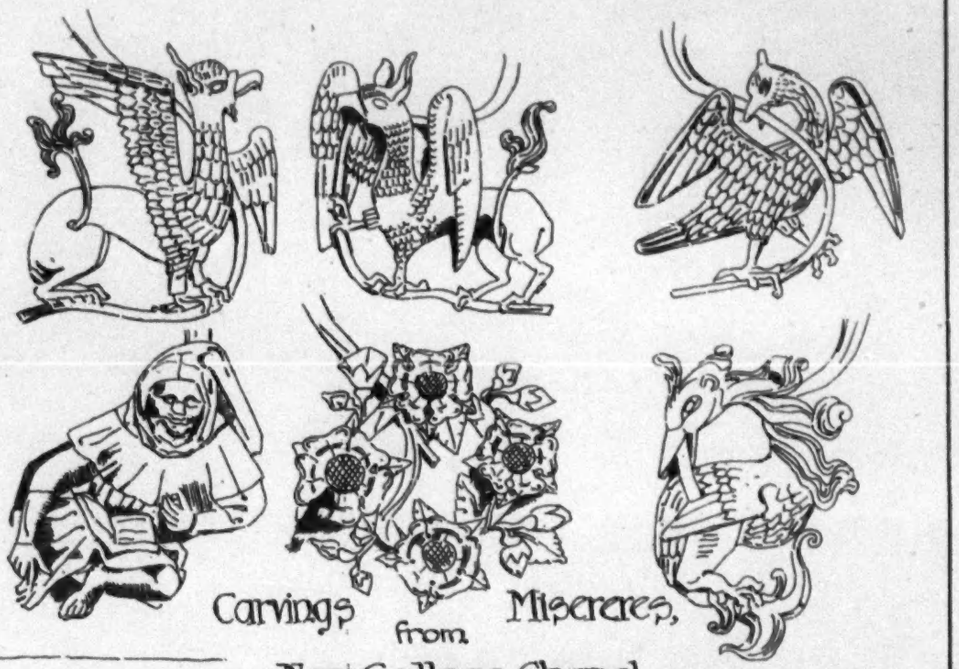
PHOTO-LITHO. SPRAGUE & Co 37, MARTINS LANE, CANNON ST, LONDON, E.C.

INTERIOR OF TOWN HALL, HOUNSLOW.—Mr. H. O. Cresswell, A.R.I.B.A., Architect.

INTERIOR OF TOWN HALL, HOUNSLOW.—ME. H. O. CRESWELL, A.R.I.B.A., ARCHITECT.



Three Misereres from Wells Cathedral.

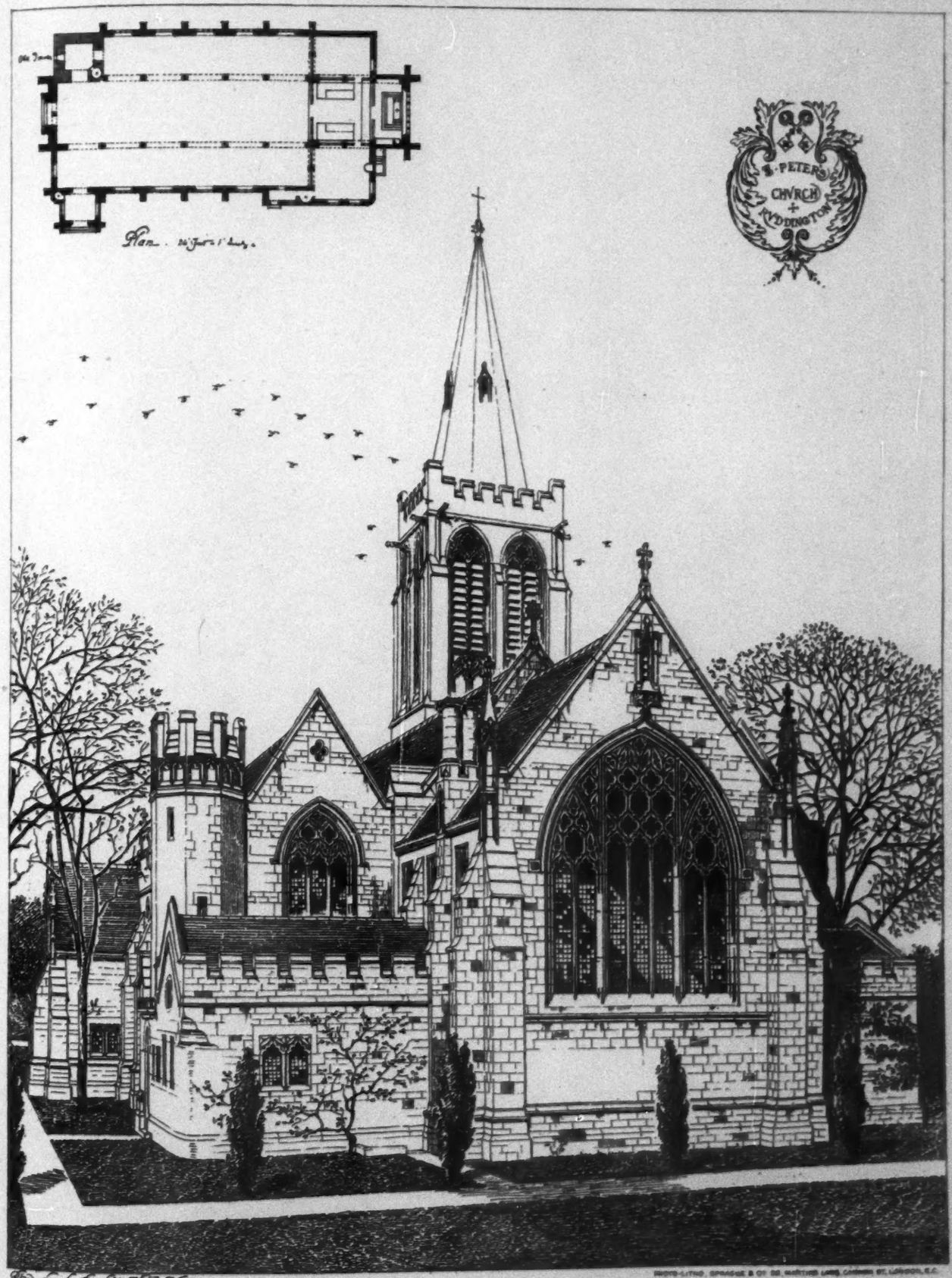


Carvings from Misereres, New College Chapel Oxford.

Miserere from St Michael's, Coventry. [The Stem of Jesse.]

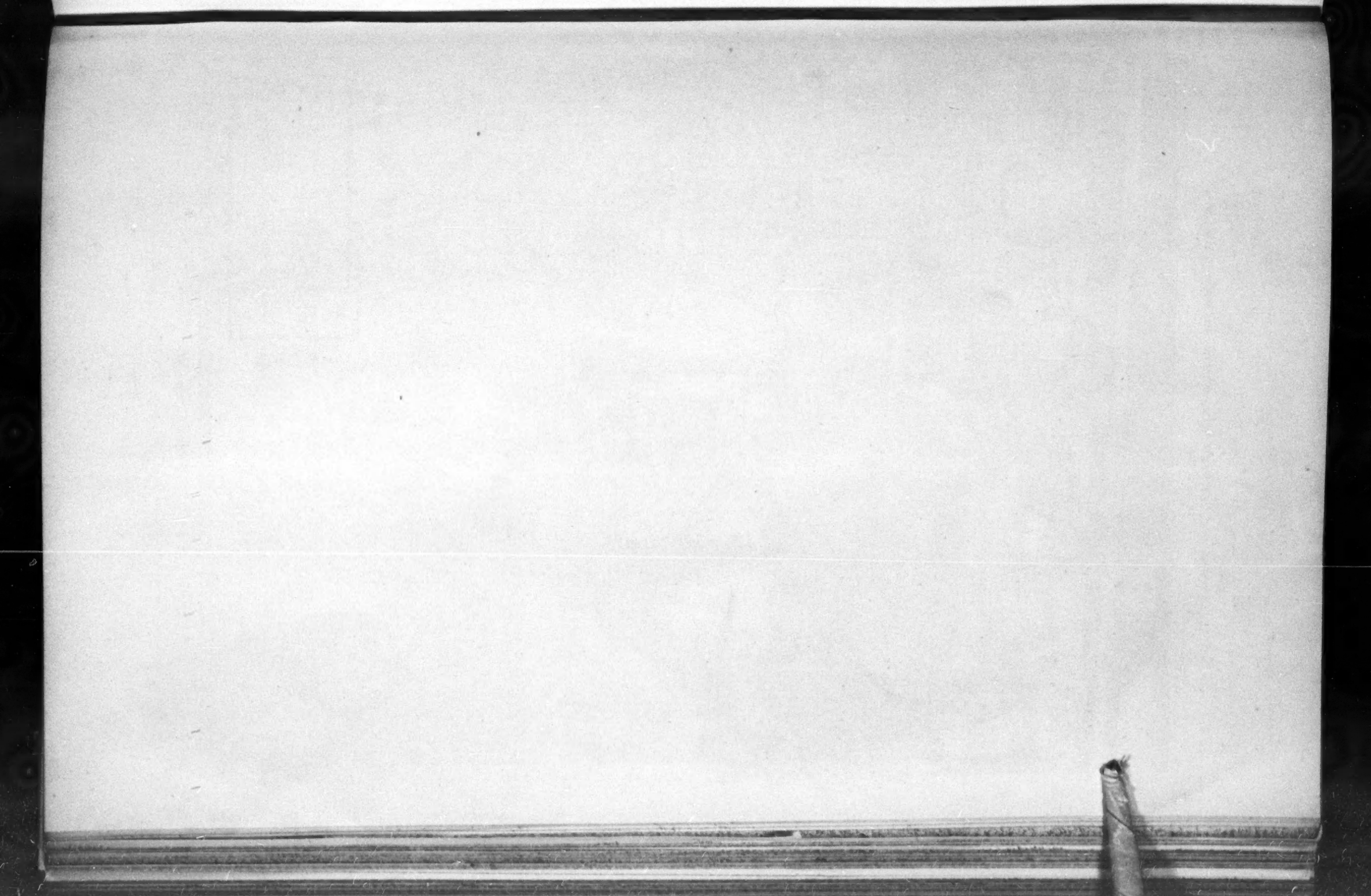
PHOTO-LITHO. SPRAGUE & Co 82, MARTINS LANE, CANNON ST. LONDON, E.C.

EXAMPLES OF MEDIÆVAL WOODCARVING.

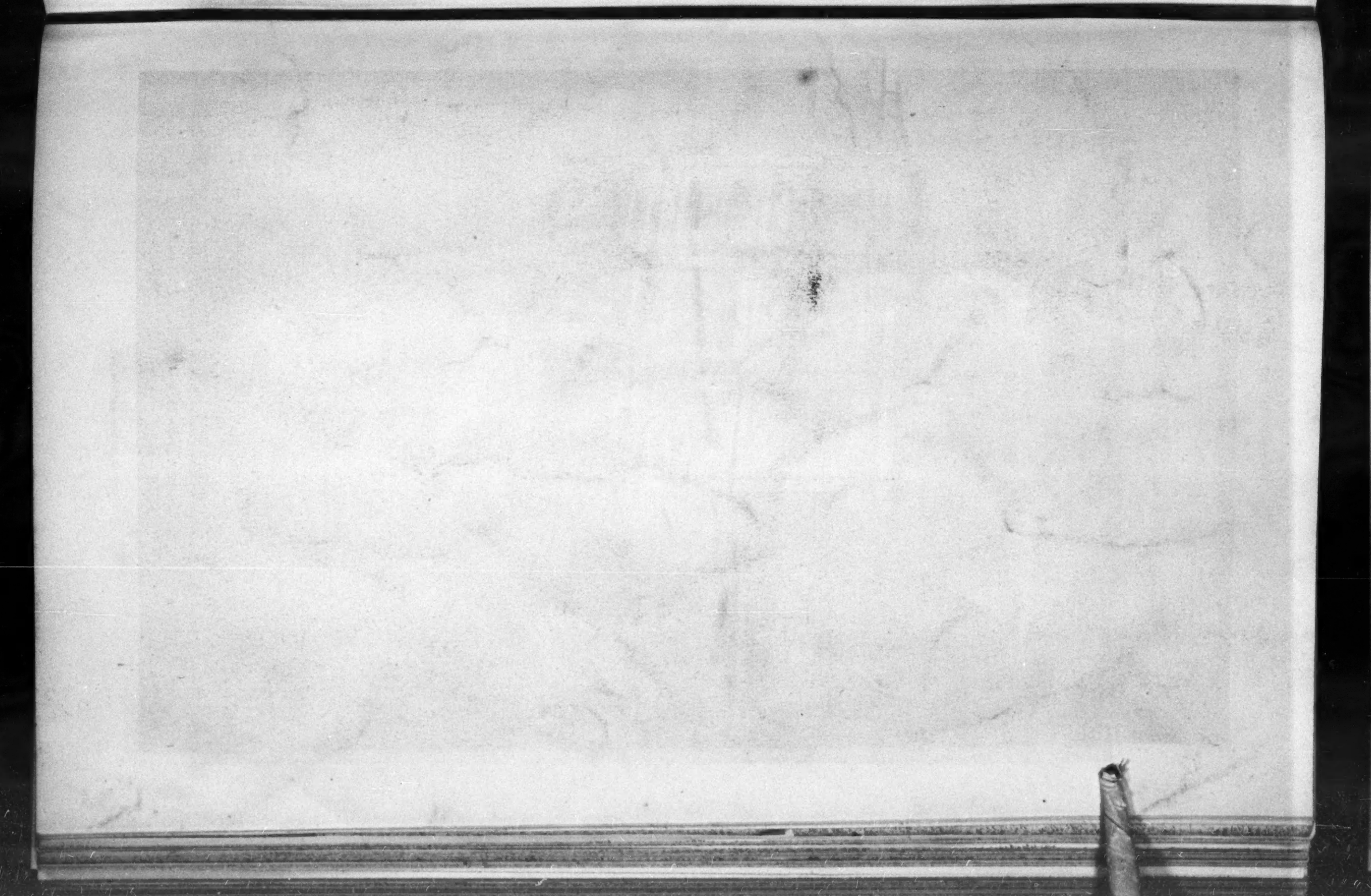


Rev. Frank Bayfield M.A. Vicar.

ST. PETER'S CHURCH, RUDDINGTON.—Messrs. Bell & Roper, Architects.



BUSINESS PREMISES, CARLISLE.—Mr. G. D. Oliver, A.R.I.B.A., Architect.



SCULPTURE; "EXILÉS": EXHIBITED IN THE SALON OF 1889.—M. MATHURIN-MOREAU, SCULPTOR.

THE CROSSNESS OUTFALL SEWAGE WORKS:

VISIT OF THE SOCIETY OF ENGINEERS.

THE new works at Crossness are part of the scheme adopted by the late Metropolitan Board of Works for purifying the sewage of the metropolis by chemical means and discharging the sludge after precipitation by means of steam tank-vessels into the open sea. Whether the plan—particularly the discharge into the sea—will be successful, it is not our present purpose to discuss. The discharge of sewage at other places into the sea has been very objectionable; and the inhabitants of some populous, popular, and healthful watering-places may have reason hereafter to object. In the meantime, however, the new works are going on, and two of the tank-vessels have been built and delivered for service. Last year the Society of Engineers visited the works in progress at Barking, on the north side of the Thames, and on Tuesday last they inspected the similar works which have been begun at Crossness on the southern side of the river. The general project is to use for precipitation the four compartments of the existing reservoir, and to supplement them by additional new precipitation channels. The intention is that the sewage shall be treated first with lime-water and next with iron-water. It is then to remain quiescent for about two hours, during which period most of the solids will be precipitated. The effluent water will be decanted over lowering weirs as quietly as possible, and run to the river when the state of the tide will permit, and at other times temporarily to an effluent store. The sludge remaining behind will be run in its wet condition into a receiving-well with a sump, from which it will be pumped into sludge-settling channels, and in them it will again remain quiescent for about ten hours, during which a further settling will take place. The effluent or "liquor" will then be run off from the settled sludge into a liquor store; after which the settled sludge will be removed from the floor into a sludge-store beneath, whence it will be pumped through pipes carried along a jetty to a pier, from which it will be discharged into one of the sludge-steamers provided for carrying it out to sea. The liquor from the liming station will, by the addition of slaked lime, be made into lime-water, and injected into the line of the outfall sewer at a short distance from the existing sewage-pumps.

For the supply of the new engines, settling-tanks for water admitted from the river will be provided; and the water from these will be used for making lime-water when the liquor is not in quantity sufficient for the demand. Water from this source will also be used for dissolving proto-sulphate of iron to form iron-water.

The new reservoir, with its precipitating channels, will occupy an area of about four acres. It will be built in two sets of chambers, one above the other. The foundation-piers have been carried down from 18 ft. to 27 ft. below Ordnance datum, to obtain a basis on the hard gravel. The trenches are filled in with concrete, and arches of the same material are being turned. The flooring will be of bricks on edge set in cement. On this a series of thirteen jack arches will be carried from north to south. On the top of these will be covering arches. Above this again will be a platform of concrete 3 ft. in thickness, upon which the upper tier of arches will be completed, and covered at top to the level of the old reservoir adjoining. The length of these superposed reservoirs is 890 ft., and their breadth 260 ft. Their summit will be brought up to 25 ft. above Trinity datum: the lower set of chambers being 11 ft. 3 in., and the upper tier 15 ft. in internal height. The existing principal and auxiliary main sewage pumping-engines will lift the limed sewage from the lowest level to the existing reservoir and into the precipitating channels. There will be four new pumps for lifting the wet sludge to the settling-tanks, the liquor to the liming station, for delivering the sludge to the ships, and for lifting the overflow of the stored sludge from the lower sludge store into the upper sludge store. There will be also other pumps and machinery for raising the clean river water to the iron-station, to the boilers, and so forth. The estimated cost of the works is over 250,000*l.* Of their gigantic extent and intricate nature some idea may be formed from the following details. The existing reservoir divided into four compartments will have 168 weirs for decanting the effluent. There will be two effluent discharge culverts carried under the old reservoir. The new precipitating channels will be divided into two compartments of six channels each. These will have forty lowering weirs for decanting the effluent. There will also be eight sludge settling channels and 48 pits and weirs for drawing off the liquor. Beyond all this, there will be various culverts, mixing-houses, engine-houses, and systems of pipes.

The works at Barking (which we fully described last year) are now nearly completed, and will be shortly opened for service. Those at Crossness have not progressed as yet beyond the foundations and the groundwork of the lower tier of settling-chambers, and the work is not being hastened. The engineers' party, with whom was the president (Mr. Jonathan Baillie), Professor Henry Robinson, Mr. Church, Mr. Newton, Mr. Cuningham, and the Secretary, Mr. Pryce Cuxson, were brought down by one of the Victoria Steamboat Company's pleasure vessels, and on arrival were entertained at luncheon by Mr. Webster, the contractor for the new works, and the author of the new system of purification of sewage by electrolysis.

After luncheon, the party witnessed the discharge of sludge from the 9,000,000 gallons experimental reservoir into one of the sludge vessels. They then visited the experimental section, where trial is being made of Mr. Webster's electrolytic system of treatment, which excited great interest. This system has already been described in detail by us. The sewage is admitted direct into a series of three wooden tanks of about 18 in. by 18 in. sectional area, and altogether some 400 ft. in total length. There are in these troughs six sections of twenty-two sets of fifteen iron plates, through which a current of 300 ampères at 2·3 volts tension across each of the six sections is passed, which is capable of purifying to the extent of more than 50 per cent. 12,200 gallons per hour. The current is generated by a dynamo of 1,600 ampères capacity. The experiments being still under operation, it would be premature to give results; but the electrical engineer in charge seemed to think that a million gallons of the London sewage could by this means be purified to the extent of 50 per cent. organic matter in solution, at a cost of 15*s.* The use of iron for electrodes has, no doubt, a great chemical advantage, for the iron will be given off in a condition to exert a primary powerful action, and afterwards in its changes to facilitate oxidation of the organic matters. Mr. Webster's theory of the electrical action is that water is decomposed when the current of electricity is of such density that it can overcome the resistance. The decomposing effects are precisely in accordance with the chemical equivalents of substances electrolysed. Thus, the same amount of electricity that would reduce fifty-six parts of iron from its solution would reduce 207 parts of lead, or sixteen parts of oxygen. Therefore the chemical changes which take place in the electrolysis of sewage are the splitting up of water, sodium, magnesium, and other chlorides, into their constituent parts. Chlorine and oxygen gases are set free at the positive pole, in a nascent condition, and consequently intensely active, so that the organic matter in the sewage is rapidly oxydised and burnt up into innocuous compounds. Hypochlorous acid and other oxides of chlorine are formed at first. The former unites with the iron, which is again precipitated, probably by the ammonia in the sewage and the oxides of chlorine destroying the organic matter.

The use of sulphate of iron for the treatment of sewage has been objected to as liable to give rise to afterchanges of a disagreeable nature,—namely, the formation of sulphides whereby, through the loss of oxygen, a residue of sulphuretted hydrogen would be given off into the atmosphere. This result could not follow on the disintegration of the chlorine from the iron, whilst the residual oxide of iron would still have its utility manifested by its further action on the remaining organic matters.

The party were conducted over the original outfall works by Mr. Houghton, and were shown the fine pumps in their handsome house, and the treatment of the sewage by the permanganate of potash process in operation. The new works were also inspected under the guidance of the contractor.

The new works are calculated to provide for the treatment of the sewage of 2,400,000 persons within the area of the metropolis south of the Thames. The sewage as it ordinarily arrives, independent of rainfall, is very much diluted, the total volume very closely approximating the quantity of water supplied by the London Water Companies,—namely, an average of thirty gallons for each inhabitant. Indeed, the amount of water remaining in the sludge put into the tank vessel,—namely, 90 per cent.,—excited much comment. In this view, the smal quantities of lime, 3·7 grains; and iron, 1·0 grain per gallon, advocated by the Official Chemist, Mr. Dibdin, become intelligible, and, although we do not here take sides in the controversies which are raging, it is only fair to observe that the official plan regards the influence of the small quantities of precipitants as curdling and throwing down a certain portion of the organic materials without rendering the alkalinity of the sewage-water sufficient to re-dissolve those organic materials.

Whatever may be the ultimate settlement of the sewage question for the metropolis, the method now adopted will soon have a practical trial at Barking on ten times the scale of the present experience, and this will, therefore, if it prove no more than a temporary expedient, help very materially towards a really final decision. The electrical system may, however, possibly prove to be a much less expensive means of high purification than the use of chemical salts.

COMPETITIONS.

Richmond Municipal Buildings.—At the meeting of the Richmond Vestry on Tuesday evening, the works Committee presented a report stating that eight sets of plans had been received in this competition. The Committee concurred in the opinion of Mr. James Edmeston, F.R.I.B.A., who acted as professional assessor, that the design bearing the motto "Q.E.D." was the best, and that with the motto "Westward Ho!" the second best, and they accordingly recommended that the first premium of £100 be awarded to "Q.E.D.," and the second premium of £50 to "Westward Ho!" This having been agreed to, it was found that the design "Q.E.D." was by Messrs. George Elkington and Son, and "Westward Ho!" by Mr. Thomas Verity.

Police Stations, Newcastle-on-Tyne.—At a special meeting of the Newcastle Watch Committee, to consider the report of Mr. Murgatroyd, assessor of the plans of the proposed new police stations to be erected at Elwick's-lane and Arthur's-hill, Mr. Murgatroyd presented the following plans, which he had selected out of a large number sent for his examination:—For Elwick's-lane Station, "Custos," 1; "G. C. D.," 2; and "Truth," 3. For Arthur's-hill Station,—"Truth," 1; "Adrian," 2; and "G. C. D.," 3. In accordance with the recommendations of the assessor, the committee selected the plan of Mr. J. S. Quilter, London, who had signed himself "Custos," for Elwick's-lane Station; and the plan of Mr. Alfred Houston, whose *nom de plume* was "Truth," was chosen for Arthur's-hill Station. It was agreed to divide 50*l.* between the second and third competitors for the two buildings. "Adrian" (Messrs. Clark & Moscrop, of Darlington) received 12*l.* 10*s.*; G. C. D." (Mr. A. D. Gibson, of Newcastle), who was second in one and third in the other, to receive 25*l.*; and "Truth," who was third for Elwick's-lane building, to receive 12*l.* 10*s.*

STAINED GLASS.

Bristol.—The Church of St. Stephen, Bristol, has just received a three-light window representing the Resurrection, in memory of the late Mr. George Macready Chute. The tracery above contains figures of SS. Paul and Cecilia, and Masonic emblems. The work has been designed and executed by Messrs. Mayer & Co., of Munich and London.

Brockley (Kent).—Messrs. Pepper & Boyes, of Euston-road, have lately placed a three-light window, representing "Our Saviour among the Doctors," in St. Peter's Church, Brockley, Kent.

Newington (Kent).—A stained-glass window representing Our Lord blessing little children, has just been placed in Newington Church, Kent. The window was designed and executed by Messrs. Warrington & Co., of London.

Prestbury.—The old parish church here has lately received an addition in the shape of a stained-glass window, from the studio of Messrs. Mayer & Co. It consists of three lights, with tracery above, and is filled with the subject of "The Baptism of Christ." The window has been erected in memory of Mr. Thos. Goodier Richmond, who is the donor of several other windows in the church executed by the same firm.

NATIONAL ASSOCIATION OF MASTER BUILDERS OF GREAT BRITAIN.

This Association held its twenty-third half-yearly meeting on Tuesday, July 23, at the Cross Keys Hotel, Hull, Mr. J. H. Colls, the President, in the chair, and representatives from London, Liverpool, Manchester, Birmingham, Bristol, Bradford, Nottingham, and Hull, were present.

The report and accounts for the past half-year were adopted.

The Employers' Liability Amendment Bill has not again been introduced to the House of Commons, and the Home Secretary has intimated that it is not intended to bring it forward until the next Session.

The question of the trades unionists' eight-hour movement was discussed.

The question of railway rates and terminal charges were discussed at very great length. The London, Birmingham, and Bolton Associations have drawn up valuable tables showing the great increase in the charges on many of the roads, but it is considered probable that the Board of Trade will object to the demand of the railway companies.

The Bill brought into the House of Commons, backed by Mr. Provand and other members, to provide for the compulsory examinations of boilers and flues, was fully discussed, and it was recommended by the Council to the members of this Association who use machinery to give it their hearty support.

The Council also urged the members to insure their risks in the Builders' Accident Insurance, Limited, which was established for their protection by this Association; the Board of Directors consists of thoroughly practical Master Builders who are connected with this Association.

The question of the Form of Contract was also fully discussed.

It was decided to hold the next half-yearly meeting in London.

In the evening, the members at the meeting were entertained at a banquet given by the members of the Hull Association.—*(Communicated).*

BUILDERS' BENEVOLENT INSTITUTION:

ANNUAL MEETING.

The forty-second annual meeting of this Institution took place on Thursday, the 25th ult. at Willis's Rooms, St. James's. Mr. J. Howard Colls (President) occupied the chair, supported by Messrs. Thomas Stirling, Charles Bussell, Robert Perkins, T. Hall, and other friends of the charity.

Major Brutton (secretary) read the report, which stated that during the past year six pensioners had died. In two cases the wives had taken the places of the deceased, while one male and one female pensioner had been elected. Happily the income for the past year, from all sources, had been sufficient to cover the necessary expenditure, and this was greatly to be ascribed to the exertions of the President in obtaining donations at the annual dinner, and to the continued generosity of the subscribers. The annual dinner will take place, with the consent of the Worshipful Company of Carpenters, at their hall, on Thursday, Nov. 7 next, when Mr. J. W. Hobbs, who has kindly accepted the position of President of the Institution for the ensuing year, will preside.

The Chairman, in moving the adoption of the report and balance-sheet, congratulated the meeting on the fact that the Institution was going on prosperously.

Mr. Thomas Stirling seconded the resolution, which was unanimously agreed to.

Cordial votes of thanks were passed to the President, the Vice-Presidents, Trustees, Treasurer, Committee, and Auditors.

The Chairman next proposed that Mr. J. W. Hobbs (Mayor of Croydon) be the President for the ensuing year. He had not the slightest doubt that Mr. Hobbs would, during his term of office, use his utmost endeavours to further the interests of the Institution (applause).

Mr. Bussell moved a hearty vote of thanks to the Chairman for presiding, which was duly seconded and agreed to, and the proceedings terminated.

"The Kulm," Bearsted, Kent.—In reference to our notice of this house in our issue of the 20th ult., we are asked to mention that the floors have been laid with Lowe's patent wood block flooring in redwood, pitchpine, and light and dark oak.

Savoy Hotel.—We are asked to mention that the lifts in this hotel, of which we published a description the other day, are all fitted with the "Bostwick folding gates."

THE LONDON COUNTY COUNCIL.

The ordinary weekly meeting of the London County Council was held on Tuesday afternoon, at the offices, Spring-gardens, Lord Rosebery in the chair.

Tenders.—The first business was to receive tenders for the alteration and enlargement of the Council Chamber at Spring-gardens. That of Messrs. J. Allen & Son, amounting to 6,600*l.*, was accepted. The tender of Messrs. J. & J. Greenwood for the cleaning of the offices at Spring-gardens was accepted at 299*l.* Tenders were also received for the construction of a viaduct, carriageway, footways, sewers, &c., between Clerkenwell-road, and Farringdon-road (forming part of the new street between Holborn and Islington). These tenders were referred to the Improvements Committee for consideration and report. (The lists will be found in this week's *Builder* under the heading "Tenders.")

The Fire Brigade.—On the recommendation of the Finance Committee, sanction was given to the expenditure of 53,650*l.* for increasing the efficiency of the Fire Brigade by establishing new stations in localities as yet inadequately provided with protection against fire.

Brockwell Park.—The Finance Committee also reported that, having further considered the resolution of the Council of the 9th inst. (No. 21), agreeing to contribute one-half of the cost, not exceeding 61,000*l.*, towards the sum required for the purchase of Brockwell Park, "your Committee have received from the Parks and Open Spaces Committee a statement as to the value of Brockwell Park and its probable value as a building site, as made by well-known experts, also the value of land recently sold or let for building purposes in that locality, and have arrived at the conclusion that the estimate of 1,500*l.* per acre as the value may be accepted, and, as directed by the Council, provision has been made in the Money Bill for a sum not exceeding 61,000*l.* as a contribution towards acquiring this property, and your Committee recommend—

'That the estimate of £61,000 towards the purchase of Brockwell Park be approved, subject to the removal of the existing statutory liability to contribute £12,500 in aid of Raleigh Park.'"

This, with a verbal amendment, was agreed to after considerable discussion, and after two or three amendments to reduce the amount had been made; but a resolution was subsequently agreed to to the effect that the contribution in this case of one half the purchase was not to be regarded as a precedent.

The Main Drainage Committee.—This Committee presented a report in fulfilment of an authorisation to them to obtain and open tenders for the supply of about 40,000 tons of coal required by the Council for its pumping stations and for other purposes. But only two firms tendered, and their prices being regarded as abnormally high, and it being suggested that the paucity of tenders was due to the manner in which the form of contract had been drawn up, the matter was referred back for further consideration, the Committee being empowered to obtain a temporary supply of coal during the recess.—In the course of the discussion which ensued as to the qualities of steam-coal required, Councillor Æneas Smith remarked that it was necessary to provide the various sewage pumping-stations, and especially the Abbey Mills Pumping-Station, with the best possible fuel, in order to get the most efficient work out of them. The engines at those pumping-stations were utterly inadequate to the work they had to do, and especially was that the case at the Abbey Mills Station, which was barely able to cope with the dry-weather flow of sewage on a summer's day. It was no wonder, under these circumstances, that in times of rain various parts of the metropolis were subject to flooding by sewage.—Councillor Westacott asked when the Council might expect the report of the Committee on the subject of the alleged breach of contract by Mr. Webster at the Crossness Outfall Works?—Councillor Rhodes, who is the Chairman of the Committee, replied that the matter was one of such extreme importance that it needed very careful weighing by the Committee.—Councillor Marsland asked for what period did the Acting-Engineer recommend that Mr. Webster should have an extension of time for the completion of his contract at Crossness, as stated in one paragraph of the Committee's report?—Councillor Rhodes replied that nine months was the period asked for.—Councillors Westacott and Samuel urged that the asked-for extension of time should not be granted until the Committee had reported on the subject of the alleged breach of contract, which had been referred to them several months ago. Councillor Samuel went so far as to suggest that the Committee were desirous of screening the contractor,—a suggestion which Councillor Rhodes warmly repudiated.—Councillors Howel Williams, Osborne, Haggis, and others took part in the discussion, in the course of which it was urged that no harm would or could be done by giving Mr. Webster the required extension of time, on the ground that while the new precipitation works at the Barking outfall were now practically ready, and would soon be making sludge enough to require five or six sludge-slips to convey it away, they had only two ships built! What was to be done with the rest of the sludge? The completion of Crossness works would largely add to the quantity of sludge; therefore, it was argued, delay in the completion of those works would be an advantage rather than otherwise.—Councillor Acworth suggested that the new Chief Engineer, Mr. Gordon, should be instructed to make it his first duty after entering upon his duties to examine into and report upon the whole question of the sewage outfalls. In reply to this it was intimated by the Deputy-Chairman that Mr. Gordon, by the courtesy of the Corporation of Leicester, would be released from his present duties at the end of August, and would take up his position as Chief Engineer of the Council on Sept. 1. The month that would intervene between that date and the re-assembling of the Council after the recess Mr. Gordon would devote to making himself acquainted with the outfall works and the staff.

The same Committee also reported, "for the information of the Council," that "an exhaustive series of experiments, extending over nearly a month, has been carried out at Crossness. The tank used was cylindrical, 6 ft. in diameter and 30 ft. high (an old disused boiler), to which such fittings were adapted as were necessary. The conclusions reached are best conveyed in an extract from the report of the Chemist who, with the superintendent at Crossness, had charge of the experiments:—

'These experiments have had a valuable result in that they have established the fact that the average quantity of water (effluent) present in the settled sludge is equal to about 90 per cent., such a conclusion being satisfactorily established by reason of facilities afforded of obtaining average samples, and confirming as it does the results obtained some time back in connection with the special series of experiments on the rate of flow of the sludge along an inclined trough. It is thus shown that settled sludge cannot be, with any regard to economy, reduced in bulk. The proposal of pressing it into cakes is one which has already been shown to be far more costly than the method of disposal by carrying it out to sea.'"

After the transaction of other business, the Council adjourned until Friday, August 2, at 3 p.m.

CASES UNDER THE METROPOLIS MANAGEMENT ACTS.

At the Hammersmith Police Court, Messrs. Batey & Co., Limited, Soda Water and Ginger Beer Manufacturers, were summoned by the London County Council for not setting back the fence in front of their premises in Munster-road, Fulham, to the extent of 20 ft. from the centre of the road, as required by the 41 & 42 Vic., c. 32, sec. 6. Mr. Thomas Burton, solicitor, appeared in support of the summons, and Mr. Webb for the defendants. Mr. Alfred Millwood, surveyor to the London County Council, said the fence was 16 ft. from the centre of the way; 25 ft. had been set back, there remaining 100 ft. In answer to Mr. Webb the witness said this was to the extent of the length of the building. The notice of the County Council had been complied with. A plan was submitted showing the block of buildings fronting the road and the length of the fence which had been set back. Mr. Webb said the land adjoining the building was intended to be let for building purposes, and, supposing it was separated by a wall it could not be contended that the defendants were liable to put back the fence. Mr. Millwood said the whole of the land belonged to the premises in the same way as the yard did to a brewery or a forecourt to a house. The defendant used the whole of the land for the storage of empty cases and bottles. Mr. Newton thought the Act did not apply to a field in which rubbish was deposited, and dismissed the summons.

At the Southwark Police Court on the 25th ult., Messrs. Dover, Wood, & Co., of Cornwall House, Stamford Hill, contractors, were summoned by the London County Council for having erected at No. 58, Blackfriars-road, Southwark, a wooden structure, or erection of a movable or temporary character, without the consent of the Council. Mr. Chilvers, from the Solicitor's Department, supported the summons, and stated that defendants, on or about March 21 last, erected the structure complained of, which, since that time, had been used as an advertising hoarding; the structure was 30 ft. in height, and projected about 5 ft. in front of the adjoining buildings, and as no building operations had been going on since the above date, the defendants had rendered themselves liable to penalties. Mr. Millwood, a surveyor in the office of the London County Council, was called, and produced a plan of the structure, and proved that no building operations had been going on since March 21 last, and that no consent had been given for the erection of the structure. For the defence, Mr. Slater, solicitor, Bromley, contended that the structure was exempt under the provisions of the section, it having been erected for the purpose of pulling down an old music-hall which formerly stood on the site, and that the defendants intended rebuilding, but had met with some difficulty in getting their plans passed, which was the cause of the delay. Mr. Slade, in giving his decision, stated it was clear from the evidence that no building operations had been going on since March 21, and he must convict the defendants, and fine them *5l.* and 10*s.* costs.

TOWN CLERKS AND TOWN SURVEYORS.

SIR,—A vulgar prejudice exists that "there is one law for the rich and another for the poor." Educated people, of course, know that the law is no respecter of persons; nevertheless, two recent decisions in the Courts show that there is one law for Town Clerks and another for Town Surveyors, and that lawyers know how to take care of themselves and of one another. The Town Surveyor of Ramsgate was employed at a moderate fixed salary to discharge the ordinary routine work of the borough. Subsequently, by resolution, he was "appointed Engineer to the Corporation for carrying out the scheme for completing the drainage," with certain agreed "allowances" for such extra services, in pursuance of which resolutions he undertook the work. Section 193 of the Public Health Act enacts that if "any officer accepts any fee or reward whatsoever other than his proper salary, wages, and allowances," he is liable to penalties and costs, and "incapable of afterwards holding or continuing in any office or employment under the Act." A common informer sued under this clause, and the Court, reluctantly, gave judgment against the Town Surveyor, admitting that the offence (?) was purely technical, involving no moral wrong-doing. On appeal the decision was reluctantly affirmed, with the result that the Surveyor was financially and officially ruined. So much for the Town Surveyor. The Town Clerk of Bury was also appointed at a fixed salary, but a drainage scheme being promoted, the Town Clerk was also paid for his extra work therein. Encouraged by the Ramsgate case, a common informer sued the Town Clerk, but was defeated. On appeal the Court denounced the action as "frivolous and vexatious," expressing an exuberance of disdain against the common informer, but no such exuberance was manifested by the Court in the case of the Town Surveyor. Now, to an ordinary practical mind the two cases are absolutely analogous, but the Courts have said that "any officer" does not mean a Clerk, but a Surveyor, although both are engaged under the same Act, appointed at a fixed salary, each paid by resolution for extra services, yet the lawyer's payment is legal and the Surveyor's illegal!

It is obvious that section 193 was directed only against dishonesty on the part of officers. The ordinary official salary is often small, and not intended to cover large special works. As the Lord Chancellor said in the case of the Town Clerk (*Times* report, July 25, 1889), "The facts here were that the defendant's salary was fixed by resolution. Then work was undertaken by the Town Council, which threw an unexpected amount of labour upon the Town Clerk. By a resolution of the proper authority, an extra sum was *regularly and properly* voted to him for this extra work." Identically the case of the Town Surveyor; but the Town Clerk retains his fees and office, and the Town Surveyor is dismissed and ruined. The hardness and injustice of the case was brought by the Council of the Association of Municipal Engineers before the Local Government Board, to whom we look as our natural protectors, asking that sec. 193 might be so amended as to avoid any such scandal, but our memorial had no result.

LEWIS ANGELL, M. Inst. C.E.,
late President of the Association of Municipal Engineers and Surveyors.

Town-hall, West Ham, July 31.

THE CHANNEL DRAIN-PIPE: R. NORMAN SHAW'S AND T. L. WATSON'S PATENTS.

SIR,—The note in your issue of the 20th of July on the above subject is fair in tone, and of the class of criticism to be welcomed as helpful in arriving at just conclusions. In the same spirit, may I be allowed a few words in reply. You say, "with care, it is possible to leave circular drains smooth inside." That is a matter, perhaps, open to question, and, in fact, it has been questioned by practical and experienced sanitarians; but it is not necessary for my present purpose to do so. Assuming that ordinary drain-joints can be made perfectly smooth inside, how are we to insure that they are made so? When a drain has been laid, how are we to know that the joints have been smoothly finished off? And even if they have been so, how are we to tell whether they have escaped dislocation or injury from settlement or accident during the progress of the building?

With the channel drains, the pipes may be left open for examination for a month, or for six months, if the building is unfinished so long, after the drain has been laid.

At any time before the covers are cemented down, we may satisfy ourselves as to the smoothness and regularity of the flow. The drains are in actual use all this time, and they are not finally closed in till all risk of injury is at an end.

Remembering that one imperfectly-finished joint is enough to impede the action of a drain, and may be enough to cause it to choke periodically, it is something to be able to provide with certainty that there shall not be even one such joint. As to the other claims made for the Channel pipes, your readers will form their own judgment. Referring to the statement that the joints can be more solidly and more tightly made than with round pipes, you say, "In view of some of the recent improvements in jointing round pipes the statement is absurd." The comparison is intended to be with ordinary pipes jointed in the usual way and, so far as they are concerned, the validity of the claim will not be disputed. It is not for a moment meant to imply that it is impossible, by means of jointing of any kind, to make round pipes tight. Such a claim, if it had been put forth, would have deserved to be called absurd.

So far, however, as I have been able to form an opinion regarding the various "improved" methods of jointing for round drain-pipes, they are all open to other and serious objections, which detract from their value, and, in fact, have prevented their general use. The Channel drains, so far as I am aware, are free from such objections, and their tightness is one only among several advantages. Probably nothing but experience can finally decide as regards some points, but the claim as to tightness may be explained in a very few words. The drain consists of two parts, the channels and the covers. Let us take the channels first. Whether the joints of a drain can or cannot be well enough made and finished from the outside of the pipe, it is transparently obvious that they can be much better done, more closely packed with cement, and more smoothly finished off inside, when, instead of a round-closed pipe, you have an open channel, and can get at the inside as well as the outside of the joint. Now, take the covers. Evidently they cannot be finished off from the inside, and evidently they involve additional jointing to begin with as compared with ordinary pipes. On the other hand the jointing, being on the top, can be more easily and more safely done than with a round pipe. But that is not all, and it is, perhaps, not enough. There is a further security to be taken which, in effect, makes the covers altogether jointless. Having first jointed them with cement and made the drain as tight as any round drain can be made, the further precaution is taken of coating the whole surface of the covers with cement. This improvement was suggested by Mr. R. Norman Shaw, R.A., and, while the covers can be made perfectly tight by jointing alone, it offers, in the simplest possible way, a guarantee of absolute tightness and the most perfect security against the escape of impure gases. It seems to be a sufficiently modest claim to say that "the smoke-test is less necessary than with ordinary pipes." You say "the whole top is a cement-joint," but would it not be more correct to say that the top is jointless from end to end? Is it conceivable or possible that they could leak with the covers first bedded and jointed with cement and afterwards coated with the same material? I do not think so. After five or six years' of experience of the channel-pipes I have never found one joint defective.

T. L. WATSON.

Glasgow, July 24, 1889.

CARTMEL CHURCH.

SIR,—In answer to a query in the *Builder* of March 16 by "A. R." respecting the stone of Cartmel church, I enclose the following extract:—

"The stone of the . . . . . ashlar walls of the older part of Cartmel Priory Church, which dates from 1188, is a fine hard drab or light yellow-coloured sandstone. . . . . Now, there is, about three miles distant from Cartmel Priory, by a flat road, a moderate-sized point on the shore-side of the park at Holker Hall, where there is a quarry of sandstone. . . . . There are beds of fine sandstone still there some feet thick, and enough to build several more Cartmel churches. The formation is coloured in the recent one-inch Ordnance geological maps as the "Yoredale Rocks," and consists of beds of shales, sandstone, and encrinite limestone" ("The Harrington Tomb in Cartmel Priory Church: Cumberland and Westmoreland Antiquarian and Archæological Society Transactions," vol. 5).

HENRY LITTLEHALES.

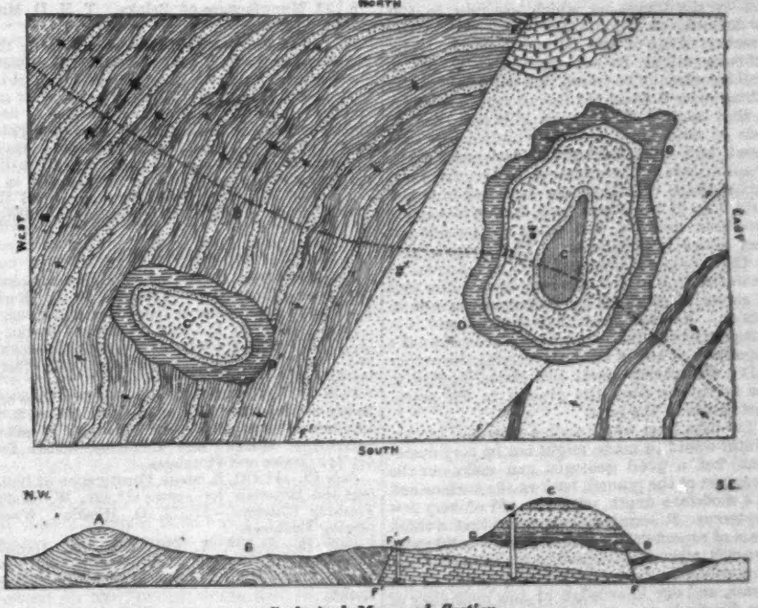
The Student's Column.

WATER-SUPPLY.—V.

DISPOSITION OF STRATA.

WE will now describe some of the principal phenomena of stratification.

A very small proportion of the original deposits of any geological epoch are left to us. After having been laid down, these missing portions were wasted away, both immediately subsequent to their deposition and up to the present time, by the action of denudation. Given plenty of time, denudation is a very powerful destroyer; the unceasing action of rivers and brooks in wearing away their channels, the solvent agency of rain and the acids usually accompanying it, frost, ice, sea-waves, winds and currents, all conspire to wear away the land, and modify the extension, thickness, and character of geological formations.



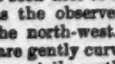
Geological Map and Section.

The connexion between denudation and water-supply will be apparent to the most casual observer. It serves to show us why deposits occur in such a broken and uneven manner, which continually assist to augment, lessen, or cut off supplies. The wearing away of the present surface of the ground in carving out the various physical features, permits the escape of water from one aquiferous bed to another, by removing a non-water-bearing stratum that originally intervened. Or, it allows water to issue forth as springs by cutting down through a non-water-bearing bed, and tapping the supply contained in a lower deposit. Thus, the geologist finds how very capriciously rain is disposed of after having soaked into the ground, and it demands the closest study on his part to foretell where it goes to, and, consequently, where it can be got at.

The disposition of strata in regard to their curvature, dislocation, &c., may be conveniently illustrated by the annexed sketch of an ideal geological map and section, the position of the latter being shown on the map by a curved, dotted line. The map may be presumed to represent a tract of country about

twelve miles long and seven miles broad, shorn of all topographical information such as rivers, roads, towns, or villages, in order to make its geological structure clear.

Suppose the observer enters the ground depicted on the map, at the top left-hand corner, he will find that the beds are clay, and *dip* (incline) to the south-east, as shown by the arrows. After having passed two thin beds of sand with a thicker bed of clay between them, also dipping to the south-east, he arrives on the clay bed marked A, which is seen first to dip to the south-east and then (as the observer proceeds over the ground) to the north-west. He plainly sees that the strata are gently curved as shown in the section, and they *strike* north-east and south-west. In technical language this is called a *synclinal axis*, and it is shown on a geological map by the sign

Following the line of section, he finds several thick beds of clays and thin sand-beds, alternating with each other, and dipping in the direction indicated by the arrows. The bed B forms the centre of what is known as an *anticlinal axis*, marked  , where the beds incline from each other, as seen in the section. On examining the ground along the line marked F′ he observes that all the clay and sand-beds abruptly terminate against a thick bed of sand in the central and southern portions, and limestone in the northern. Should he be fortunate enough to discover a sand-pit, or cutting along the junction, this would be found to result from a dislocation, called in geological terminology a *fault*. He notes the occurrence of a *well* at W′, and obtaining particulars finds that the sand-bed is underlaid by the limestone which *outcrops* to the northwards, an observation confirmed by the direction of dip of the latter bed itself. Some difficulty might be encountered at D, but it would eventually be found that the whole of the oblong mass C along the line of section, as well as that marked C′ D′, were hills composed of beds of sand, marl, and clay, horizontally disposed, and lying unevenly on the beds below. These masses C C′ are termed *outliers*, from the circumstance that they are detached from the *main mass* of the same beds, from which they have been *denuded*, and which are outside the area under consideration. The irregularities at the points of junction D D′ are known as *unconformities* or *unconformabilities*. The well W serves to establish the succession as seen in section. Another *fault* F is proved, and it is certain that the dislocation took place before the deposition of any of the beds forming the *outlier* C D. Alternating sands and clays, dipping to the north-west form the ground in the south-east corner of the area.

The data from which such a map and section as this would be made, might not be very numerous, but a good geologist can make out the structure of the ground, both at the surface and at a moderate depth, with the aid of very few exposures. It occasionally happens that a thick mass of superficial deposits mask the solid rocks beneath, when it is exceedingly difficult, if not impossible, to determine the disposition of the strata, and our knowledge of the hydrology of the district is correspondingly imperfect.

VARIORUM.

THE "Pall Mall Popular Guide to the Paris Exhibition," issued from the *Pall Mall Gazette* office, is a very useful guide to those who are visiting Paris for the first time, in regard to ordinary guide-book information. It must not, however, be accepted as a guide in artistic and architectural criticism of exhibits, about which it is as superficial as English daily papers generally are.——"Jarrolds' Directory of Cromer and Neighbourhood" (published by Jarrold & Sons, London and Norwich) is likely to be found a useful handbook to the locality which it embraces. It contains a street directory, alphabetical lists of inhabitants, and professional and trades directory. Postal information and lists of public institutions, local authorities and officials, churches, chapels, and schools, are included in the book, which should prove useful to visitors.

The Surveyors' Institution.—We are asked to mention that the rooms of this Institution will be entirely closed from August 1 to 31st inclusive, in order to admit of repainting and decoration.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

7,717, Windows. G. and G. Allan.

The purpose of this invention is to allow for the easy removal of the sashes which are hung with weights in the ordinary way, but without parting or inside batten rods. The sash is kept in position by slips, strips, or feathers, one on each side, which are let into corresponding grooves in the pulley style. These fulfil the double purpose of battens and parting rods. Both are attached to the sash—one fixed, the other movable; the latter being worked by springs or by hand. When both cords are detached from the sash, and the movable feather or slip is withdrawn from its groove, the sash can be at once removed for cleaning or other purposes.

10,219, Door-spring and Alarm. R. W. Gamble.

According to this invention, the opening of a door causes the bell or a gong to be struck, and a spring bolt operates against an inclined face-plate to effect the closing of the door after the bolt is released.

12,061, Chimney-tops, Pots, and Cowls. M. Smith.

The improvements which are the subject of this patent consist of vertical slots in each side of the shaft of the chimney-cap, whereby a clear blow through is maintained, and by the position of the cowl a down-draught is prevented.

12,350, Portable Covering or Roof. J. Elwell.

According to this invention, ropes or chains with iron hooks to receive the edges of corrugated plates are laid over the object to be covered; the ends are staked or fastened, and a ridge-cap or crest surmounts the whole.

14,491, Brick and Tile Apparatus. W. Sayer.

According to this invention, a special form of radial rocking-bar is used in connexion with the cutters of this class of machinery.

8,133, Manufacture of Bricks. T. H. D. May and H. A. Brown.

This invention relates to improvements in the manufacture of bricks, and the machinery therefor. The die through which the clay passes is divided by vertical partitions, so that three or more bricks are expressed from the die at a time, instead of one. They also issue with their short sides horizontal instead of vertical, and a special provision is made for lubricating the clay as it passes through the die, and for rollers to act as guides for the clay as it issues from the die. These serve to direct the divided stream of clay as it travels to the cutting-off table.

NEW APPLICATIONS FOR PATENTS.

July 15.—11,310, A. Brown and H. Pruce, Spindling Door Knobs, &c.—11,336, R. & H. Burk, Workman's Timekeeper or Recording Apparatus.

July 16.—11,385, R. Gibbs, Bricks and Blocks.—11,387, J. Pullen, Opening and Closing Casements and Fanlights.—11,403, N. Procter and others, Brick-making Machines, &c.

July 17.—11,444, M. Adams, Roofing Tiles and Sheets or Plates for Roofing, &c.—11,445, A. & T. Leadbeater, Attaching Door Knobs to Spindles.—11,462, J. Gilligan and A. Tilney, Smoke Preventing Grates and Fireplaces.

July 18.—11,492, R. Stone, Construction of Buildings and Materials for same.—11,494, W. Bodin, Flushing Cisterns.—11,517, G. Hopkins, Wood-planing Machines.

July 19.—11,558, A. Ridout and W. Hanson, Balancing the Weight of Window Sashes, &c.—12,570, A. Boult, Closing Devices for Keyholes and Locks.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,101, A. Bellamy, Flushing Water-closets, &c.—8,845, N. Proctor and others, Machines for Making Bricks and Briquettes.—9,136, G. Olliver, Ventilating Sewers and Drains.—9,199, W. Harrison, Closing Swing-doors.—9,338, J. Ingleson, Construction and Fitting of Window-sashes and Frames.—9,807, J. Upton, Fastenings for Double Doors, &c.—10,032, G. Bellingham, Fastenings for Doors and Windows.—10,085, R. & E. Sankey, Wall Decoration, Tiles, Panels, &c.—10,052, J. Cleminson, Sliding Doors.—10,070, J. Atherton, Door-handles.—10,124, C. Burghardt, Preparation of Paints, &c.—10,127, J. Norton and F. Hindle, Door Checks and Springs.—10,285, H. Harris, Opening and Closing Doors.—10,368, W. Cromack, Paints.—10,409, C. Scott, Brick-kilns Fired by Gas.—10,616, J. Wilson, Fire-resisting Flooring, &c.—10,632, G. Hay, Fire-grates or Stoves.—10,770, E. Edwards, Movable Centreings for Masonry or other Arches, built between iron-girders.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

10,149. S. Tuddenham, Metal Strips for Sash-bars, &c.—13,155. W. Joynson‡ Roof Gutters.—13,509. J. Shanks, Siphonal Cisterns for Water-closets.—14,175. L. Pichery, Tools for working Stone, &c.—17,570. J. Carpenter, Sliding Sash Windows.—6,179. J. Simpson, Raising, Lowering, and Sustaining Window-sashes.—7,583. J. Lancaster, Glazing, &c.—8,369. O. Fleck and others, Veneer Cutting Machine, &c.—9,270. C. Rogers, Wood Screws.—9,913. W. Wheatley, Swinging Scaffold.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

JULY 20.—By FAREBROTHER, ELLIS, & Co. (at Oxford).

Oxford, near—Four f. cottages, r. £25. 8s. p.a.	£500
A double stone-built cottage, f.	105
Four double stone-built cottages, f.	190
Enclosures of pasture land, 11a. 3r. 29p., f.	500

JULY 22.—By HUMBERT, SON, & FLINT.

Watford—"The Shrubbery," and 1a. 2r. 7p., f.	3,700
Edgware—"The Old George," f. public-house, with stabling, &c.	2,375
Clerkenwell—43, Exmouth-st., u.t. 26 yrs., g.r. £7, r. £50 p.a.	800
97, Roseman-st., u.t. 26 yrs., g.r. £8. 10s., r. £36 p.a.	300

By G. STOCKINGS.

Barkingside—Two enclosures of f. land, 19a. 3r. 23p.	1,110
Two enclosures of f. land, 13a. 1r. 7p.	750

By FLEURET & SONS.

Catford Bridge—A profit rental of £20 p.a., u.t. 35 yrs.	315
A plot of f. land	600

By HARDING & LOW.

Hemel Hempstead—High-st., "The Coach and Horses," f.	610
Boxmoor—"The Three Crowns," f. beer-house	370
King's Langley—"The King William the Fourth," f. beer-house	370
The interest in the "Red Lion," Laverstock-green, u.t. 7½ yrs., r. £30; "The George," Nash Mills, u.t. 7½ yrs., r, £30; "The Red Lion," King's Langley, u.t. 7½ yrs., r. £30; "The Saracen's Head," u.t. 7½ yrs., r. £35; and "The Bell," Bovingdon, u.t. 8 yrs., r. £35	310
Redbourn—"The Queen Victoria," f. beer-house	610
Markyate-st.—"The Five Horse-Shoes," f. public-house	720
Chesham—"The New Inn," f. beer house	880
"The Eagle," f. beer-house and paddock	910
Church-st.—"The Bell," f. public-house	500
"The White Lion," f. beer-house	720
"The Sun," beer-house, u.t. 12½ yrs., r. £25 p.a.	100
Great Berkhampstead—"The Castle Hotel," c.	2,180
Four cottages in Castle-st., c.	160
Luton—"The White Hart Inn," f.	2,700
"The Hearts of Oak," f. public-house	1,880
St. Ann's-st.—A plot of f. land	60
"The Lea Bridge Inn," f.	3,050
"The Bute Arms," f. public-house	1,380
"The Moulders' Arms," u.t. 11 yrs., r. £45 p.a.	130
London Colney—"The Golden Lion" public-house, u.t. 19 yrs., r. £25 p.a.	125
St. Albans—"The Blockers' Arms," f. beer-house and cottage	710
"The Acorn Tavern" and plot of land, f.	2,200
Albert-st.—"The Garibaldi" beer-house, f.	820
A plot of f. land	20
"The Great Northern Inn," f.	2,380

JULY 23.—By MONTAGU & ROBINSON.

Bermondsey—280 and 282, Rolls-rd., u.t., 70 yrs., g.r. £12, r. £62. 8s. p.a.	290

By VAUGHAN & Co.

Hackney, Sutton-pl.—A plot of f. land	150

By GEO. GOULDSMITH, SON, & Co.

Knightsbridge—16, Montpelier-sq., u.t. 55 yrs., g.r. £10	1,370

By J. W. COUCHMAN.

Tottenham, St. Ann's-rd.—A plot of f. land, 1a. 3r. 35p.	1,425

By MESSRS. FOSTER.

Regent's Park—87, 91, and 93, Gloucester-rd., u.t. 63 yrs., g.r. £20, 10s., r. £152 p.a.	1,390
96, 97, and 101, Gloucester-rd., u.t. 63 yrs., g.r. £19, r. £156 p.a.	1,415
137, Stanhope-st., u.t. 49 yrs., g.r. £6, r. £52. 10s. p.a.	600
48 and 49, Chester-mews, u.t. 34 yrs., g.r. 15s., r. £46. 10s.	415
North Kensington—Nos. 10 to 16 (even), and 18, St. Lawrence-rd., u.t. 75 yrs., g r. £40, o.r. £275 p.a.	1,900
7 and 9, St. Lawrence-rd., u.t. 75 yrs., no g.r., o.r. £118 p.a.	965
South Kensington—39, Eardley-crescent, u.t. 77 yrs., g.r. £8, r. £60 p.a.	690
18 to 24 (even), Kempsford-gardens, u.t. 77 yrs., g.r. £24, r. £202 p.a.	2,025
30, Kempsford-gardens, u t. 77 yrs., g.r. £6, r. £46 p.a.	455

By F. HARDS & BRADLEY.

Twickenham—9 Netherton-rd., u.t. 99 yrs., g.r. £8. 10s., r. £35	325
Greenwich, Lorne-tce.—F.g.r. of £40. 0s. 6d., with reversion in 75 yrs.	930
Bethnal Green—An improved r. of £30 p.a., u.t. 56 yrs.	400
Greenwich—L.g.r. of £12, u.t. 58 yrs, at a g.r. 0s. p.a.	195

By RUSHWORTH & STEVENS (at Southampton).

Southampton, near—"Langdown Lodge" and 30a. 0r. 33p., f.	3,000
F. cottage with stabling, 8a. 2r. 12p.	500
Two enclosures of f. land	150

JULY 24.—By TOPLIS & HARDING.

Marylebone—L.g.r. of £118, u.t. 15 yrs., at a peppercorn	1,105

By BAXTER, PAYNE, & LEPPER.

New Cross—27, Florence-st., f., with possession	460

By C. M. CROSS.

Kensington—2a, 3a, and 4a, Russell-mews, u.t. 72 yrs., g.r. £18, r. £92 p.a.	935

By H. DONALDSON.

Walworth-rd.—No. 93, u.t. 55 yrs., g.r. £15, r. £90 p.a.	1,150

By PERKINS & CÆSAR.

Bermondsey—28 and 30, George-row, f., r. £48 2s.	400
New-cross—32, Barlborough-rd., u.t. 96 yrs., g.r. £4, r. £30. 10s. p.a.	220

By E. Wood.

Hoxton—14, Newton-st., u.t. 47 yrs., g.r. £5, r. £94 p.a. £340

July 25.—By White, Druce, & Brown.

Wimpole-st.—No. 56 and stabling, u.t. 24 yrs., g.r. £80, r. £280 p.a. 2,330

By Glasier & Sons.

City—61, Farringdon-st., f. r. £90 p.a. 1,900
Hanworth—Enclosures f. land, 33a. 3r. 24p. 4,300
Clapham-common—No. 24, "Champion House," f., e.r. £130 p.a. 1,470

By C. C. & T. Moore.

Spitalfields, Gt. Pearl-st.—"The Prince of Wales," f. 380
1, Little Pearl-st., f., e.r. £50 p.a. 320
Upton—1 and 2, Eugenie-villas, f., r. £76 p.a. 1,320
Deptford, Canterbury-rd.—f.g.r. £36. 15s., with reversion in 77 yrs. 870
Wood-green—F.g.r. of £25, with reversion in 79 yrs. 555
Whitechapel, Half Moon-passage—C. warehouse, r. £40 p.a. 730
2 to 8, Half Moon-passage C., r. £90 p.a. 1,630
Mile-end—8, Heath-st. and 7, Old Church-rd., f., r. £54. 12s. p.a. 500
Bow—82, 84, and 86, Campbell-rd., u.t. 73 yrs., g.r. £5, r. £84 p.a. 750
South Hackney—6, Speldhurst-rd., u.t. 53 yrs. g.r. £5, r. £33 p.a. 270
Barnet, Sebright-rd.—Two plots of f. land 40
Lower Sydenham—47 to 53 (odd), Porthcawe-rd., u.t. 82 yrs., g.r. £18. 300

By E. Stimson.

Westminster—12, 14, and 16, Vincent-st., u.t. 19 yrs., g.r. £12, r. £93 420
99, Rochester-row, u.t. 4 yrs., g.r. £15, e.r. £70 p.a. 100
114, and 116, Horseferry-road, u.t. 14 yrs., g.r. £13., r. £138 7s. p.a. 500
Vauxhall—34, Harleyford-rd., u.t. 17 yrs., g.r. £5, e.r. £45 250
Brixton—57 and 59, Geneva-rd., u.t. 76, g.r. £12, e.r. £56 500
Peckham-rye—No. 23, u.t. 23 yrs., g.r. £8. 4s., e.r. £50 p.a. 380
Bermondsey—2, Catlin-st., u.t. 57 yrs., g.r. £3, r. £33. 16s. p.a. 220
Walworth—96 to 102 (even), South-st., u.t. 62 yrs., g.r. £23. 10s. 985

By Newbon & Harding.

Highbury—21, Leconfield-rd., u.t. 60 yrs., g.r. £5. 10s., £32 220
Holloway—137, 139, and 141, Blackstock-rd., u.t. 77 yrs., g.r. £18. 18s., r. £102 p.a. 640
32, Hertslet-rd., u.t. 71 yrs., g.r. £6, r. £36 p.a. 245
34, Hertslet-rd., u.t. 71 yrs., g.r. £6, r. £36 p.a. 220
11 to 21 (odd), Roden-st., u.t. 71 yrs., g.r. £30, r. £212 p.a. 900
74, Bickerton-rd., u.t. 67 yrs., g.r. £6. 10s., r. £34 280
Islington—114, Barnsbury-rd., u.t. 30 yrs., g.r. £8 300
24, 26, 44, and 46, Britannia-row, f., r. £140. 8s. 1,060
16 to 24 (even), Windsor-st., f., r. £140. 8s. 1,110
40 to 52 (even), Windsor-st., f., r. £223. 12s. 1,680
Battersea—12 and 13, Freeland-st., f., r. £41. 12s. 455
Brompton—30A, Fulham-rd., u.t. 69 yrs., g.r. £30. 10s., r. £120 p.a. 750

By J. & R. Kemp & Co.

Whitechapel—18 Church-lane, f., r. £52 p.a. 750

By A. G. Thomson & Co.

Belgravia—42 Hanover-st., u.t. 35 yrs., g.r. £7. 10s., r. £52. 10s. 485

By Jones & Son.

Ratcliffe—White Horse-st., a plot of f. land 295

By Baker & Sons.

Dunstable—A plot of f. land, 0a. 2r. 0p. 160

By Woods & Snelling.

Newington-butts—60 Albert-st., u.t. 56 yrs., g.r. £4. 10s., r. £26 245

By Rushworth & Stevens (at York).

Ripon, near—"The Cundall Manor Estate" of 1,281 acres, f. 34,000

July 26.—By W. B. Hallett.

Chelsea—36 Cheyne-row, f., with possession 3,300
Willesden, Shrewsbury-rd.—A plot of f. land 38

By G. H. Masterman & Co.

Slinford, Sussex—Three plots of f. land, 10a. 1r. 27p. 545
An enclosure of land, about 7 acres, f. 195
Shoreditch—25 to 29 New Norfolk-st., f., r. £182 p.a. 710

By Green & Son.

Bishopsgate-st. Within—No. 81, f., r. £170 p.a. 5,000

By Messrs. Trollope.

Hampstead—42, Hemstall-rd., f., r. £40 p.a. 540

By Penning & Daniel.

Hendon—The house called "St. Ronans," u.t. 93 yrs., g.r. £7. 10s., r. £23 p.a. 260

By G. A. Wilkinson.

Barnes, Railway-st.—The f. house "Alexandra," r. £30. 16s. 160
The adjoining house "Stroudwood" 210
Bermondsey—103, George-row, f., r. £23. 8s. 175
Canonbury—L.g.r. £37. 10s., u.t. 29 yrs., at g.r. of £12 p.a. 340
Islington—24, Compton-ter., u.t. 28 yrs., g.r. £10, r. £80 p.a. 530
Peckham-rye—No. 209, "Fauseat," f., with possession 300
"Gothic Lodge," f., r. £34 p.a. 280
Lower Clapton—103 and 104, Cricketfield-rd., f., r. £90 p.a. 600

By Rogers, Chapman, & Thomas.

Chelmsford, High-st.—F. Bank Offices, r. £267. 15s. p.a. 4,600

By Robert Reid.

Tottenham Court-rd.—No. 60, f., r. £170 p.a. 3,010
Fitzroy-sq.—93, Charlotte-st., f., r. £70 p.a. 1,320
Marylebone-road—141 and 147, and stabling, f., r. £160 p.a. 2,200
7 and 8, Wyndham-st., f., r. £80 p.a. 1,535
Bryanston-sq.—6, Molyneux-st., f., r. £45 p.a. 800
10, Shouldham-st., f., r. £80 p.a. 625
Edgeware-rd.—A rent charge of £5. 5s. p.a. 100
Westminster, Tufton-st.—"The Crown" public-house, f. 2,700

By Baker & Sons.

Fulham, Aspenlea-rd.—Two plots of f. land 388

Mundesley, Norfolk—Four enclosures of f. land, 20a. 0r. 26p. £1,860
Hammersmith—Nineteen plots of f. land 2,740
Westgate-on-Sea—Eleven plots of f. land 935
One plot of f. land 330
Herne Bay—The f. residence "Mount Pleasant," and 11 acres 1,760
Hampstead—"Kidderpore Hall," and 22a. 3r. 19p. f. 43,000
A plot of f. land, 2a. 0r. 8p. 4,300

[*Contractions used in this list.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

MEETINGS.

Saturday, August 3.

British Archæological Association.—Lincoln Congress (continued). (For programme, see *Builder* for July 20, p. 47.)

Monday, August 5.

British Archæological Association.—Lincoln Congress (First extra day.)

Tuesday, August 6.

British Archæological Association. — Mr. G. Mackenzie on "Mohammedan Architecture in India."

British Archæological Association.—Lincoln Congress. (Second extra day.)

Royal Archæological Institute of Great Britain and Ireland.—Opening meeting of the Annual Congress at Norwich. (For programme, see *Builder* for July 20, p. 46).

Wednesday, August 7.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.

British Archæological Association.—Lincoln Congress. (Third extra day.)

Royal Archæological Institute of Great Britain and Ireland.—Norwich Congress (continued).

Thursday, August 8.

Royal Archæological Institute of Great Britain and Ireland.—Norwich Congress (continued).

Friday, August 9.

Royal Archæological Institute of Great Britain and Ireland.—Norwich Congress (continued).

Saturday, August 10.

Royal Archæological Institute of Great Britain and Ireland.—Norwich Congress (continued).

Miscellanea.

The Bilbao Harbour Works.—Since 1887 engineering works of great magnitude for improving the harbour of Bilbao have been carried out, and last year the works in the river Nervion itself were completed. However, the greater part of the works still remains,—viz., the construction of an outer port at Santurce and Algasta, beyond the "bar." The foundation-stone of these works was laid last autumn, the engineer being Señor Evaristo de Churuka. The works will consist of a breakwater 1,450 mètres in length, running out from the eastern shore, and protecting the mouth of the river and the harbour. The breakwater will run in a direction north-west for a distance of 950 mètres, the remaining 500 mètres forming an angle of 165 deg. with the former. Another pier, 1,072 mètres in length, will be constructed from Point La Begona. The entrance to the port will be to the north-east. The harbour will have an area of 287 hectares, of which 205 will have a depth of from 5 to 15 mètres at low water. The works are estimated to occupy seven years, and to cost about 2,000,000*l.* When finished, Bilbao will boast the finest and largest harbour on the Spanish coast, that of Mahon being only 244 hectares, Barcelona 130, and Carthagena 126 hectares.

The Vienna Water Supply.—In consequence of the continued drought in Vienna, the waterworks of that city have been unable to maintain the supply, and water has to be drawn from the Schwarza river. As, however, this water is far from pure, the hygienic council has urged upon the Corporation of the city to take steps to ensure a steady and pure supply of water, and the latter body is now engaged in considering the question. An English firm has offered to construct new and extensive waterworks, but the offer has been rejected, the cost being too heavy.

New Fortifications at Antwerp.—General Brialmont, Inspector-General of the Belgian Engineers, has just submitted to the Minister of War the plans and designs in connexion with the scheme which it is proposed to carry out at Antwerp for the purpose of protecting the intrenched quarters of the city against the new explosives. A series of forts will be constructed on the left bank of the River Scheldt, and the existing fortifications on the opposite bank will be correspondingly transformed. The project will involve an expenditure of about 30,000,000 francs, or 1,200,000*l.* sterling.

International Railway Congress.—The third International Railway Congress is to be held in Paris during the latter part of September. The first meeting was held in Belgium in 1885, the second in Italy in 1887. Most of the chief European railways will be represented, while there will be a fair sprinkling of members from America and the colonies. Our contemporary *Engineering* remarks that these Congresses are a sign of the times. A few years ago they would have been impossible; pride and national prejudice would have held all the elements apart. Our English managers and engineers would have smiled at the idea that they had anything to learn from the Continent, and would have felt it was no part of their functions to teach other people. Now we find nearly all the leading lines are sending representatives, and are joining in the proceedings with great heartiness. On many points they have nothing to learn from Continental practice; our permanent way is the best in the world, and our locomotives can bear comparison with any. But when it comes to railway management there would seem to be some defects in our system, when its cost is compared with that of the German lines. Manufacturers and traders declare that their businesses are ruined by the high charges of the railway companies, while their foreign rivals are able to pour goods into the home market by the advantages offered to them in the way of light railway freights and sea carriage. In America, again, the companies economise by the large proportion of paying load which they carry, and which is enormously greater than can be done in this country. It is idle to suppose that we can successfully compete either with the Germans or the Americans in these particulars, but it is equally certain that our practice might be much improved. The cost of handling goods and marshalling trains is certainly excessive, while the practice of running half-empty trucks might be much restricted. The English representatives of the railways might with advantage devote their attention to seeing how these matters are managed abroad, and so bring about a better feeling between the carrying and trading interests of this country.

Building Trade Wages in Servia.—The British Vice-Consul at Nisch, in a recent report on the trade of Servia, gives the following examples of the rates paid to workmen in the various trades:—

Bricklayers and masons: Summer, 2s. 10d. to 3s. 7d. per day; winter, 2s. 5d. to 3s. 1d. per day.
Brickmakers: Italians, 5s. 7d. per thousand; others 4s. 9½d. per thousand.
Carpenters: All the year round, 3s. 2½d. to 4s. per day.
Gilders: All the year round, 3s. 2½d. to 4s. per day.
Glaziers: All the year round, 2s. 5d. to 3s. 2½d. per day.
Locksmiths: (Austrian), 2s. 5d. to 3s. 2½d. per day; (Bulgarian and Macedonian), 1s. 7½d. to 2s. 5d. per day.
Painters: Summer, 2s. 10d. to 3s. 7d. per day; winter, 2s. to 2s. 10d. per day.
Paperhangers (Austrian): 3s. 2½d. to 4s. per day.
Stonemasons (Germans and Italians): Summer, 4s. 9½d. to 6s. 5d. per day; winter, 4s. to 5s. 7d. per day.
Tinsmiths: 2s. 5d. to 3s. 2½d. per day.
Day Labourers: Summer, 1s. 7½d. to 2s. 1d. per day; winter, 1s. 3d. to 1s. 9d. per day.
Mortar Carriers (girls and women): 9½d. to 1s. 3d. per day.

Berlin Streets and Bridges.—The streets and squares of Berlin, as we learn from the *Berliner Fremdenblatt*, at present exceed 900 in number. The principal river of Berlin, the Spree, is bridged twenty-five times in its course through the city; while the canals leading into the river on both sides are crossed by forty bridges. The Panke, a tributary of the Spree, has twelve crossings. The number of Berlin churches, chapels, and synagogues is over ninety—not excessive for a city of 1,120,000 inhabitants.

The Sanitary Institute.—At an examination for Local Surveyors, held on July 25 and 26, nine candidates presented themselves. Questions were set to be answered in writing on the 25th, and the candidates were examined *viva voce* on the 26th. The following candidates were certified to be competent, as regards their sanitary knowledge, to discharge the duties of Local Surveyors, viz.:—William Gibson, Exeter; Joseph Bennett Massey, Burnley; Joseph Radcliffe, Todmorden; David John Reid, Inverness and Samuel Towson, Plumstead.

The London County Council and Slaughter-houses. — The London County Council have framed a code of by-laws, under the 37 and 38 Vict., cap. 67, to be confirmed by the Local Government Board, for the conduct, structure, and establishment anew of slaughter-houses within their jurisdiction. This code will repeal the set of by-laws made in that behalf by the late Board of Works on May 7, 1875. The structural requirements demand that, *inter alia*, every slaughter-house shall have a floor-space of at least 100 square feet, with walls to a height of 6 ft. from the ground, built of brick, stone, iron, or concrete, and, together with the doors and woodwork, covered within with hard, smooth, and impervious material to at least that height; that each slaughter-house, and pound, pen, or lair upon the premises, shall be lighted and ventilated by louvred openings in walls and roofs or other approved openings, but have no openings therefrom leading directly into any dwelling, and shall be well paved with granite, cement, concrete, or other approved hard and impervious material, set with cement properly bedded on concrete. Such paving is to have a proper slope towards a gully hole, communicating by an adequate drain of glazed stoneware pipes with the public sewer. A breach of these regulations will involve a maximum penalty of 5*l.*, and, in the case of a continuing offence, a penalty of 1*l.* for every day after conviction for the first offence; but the rules will not, until six months have expired from their confirmation by the Local Government Board, be deemed to apply to any premises where, at that date, the business may be carried on; nor will they apply to any premises which may be rendered exempt therefrom by a re-licence granted by the Council. Every person applying for a new slaughter-house must furnish full plans and sections, to a scale of $\frac{1}{4}$th inch to one foot, with a key plan to show all the locality within 250 yards of the site, on a scale of five feet to one mile. The like penalties are imposed for breaches of the rules as to cleansing, ventilating, draining, &c., of the premises, and as to the prevention of unnecessary cruelty. By way of additional penalty, every court of summary jurisdiction is empowered, by summary order, in virtue of section 4 of the Slaughter-houses, &c. (Metropolis) Act, 1874, to suspend or deprive altogether any person of the right to carry on his business as a slaughterer of cattle.

The English Iron Trade.—Although the English iron market cannot be described as very active, excepting in the hematite, pig, and steel branches, its tone is extremely buoyant. The Cleveland and Scotch pig-iron markets are very strong, the rise in the former being 1s. 6d. per ton on the week. A large volume of trade has been passing in the Glasgow warrant market, amidst considerable fluctuations in prices, and Scotch makers are firm in keeping up their quotations, which have been further advanced from 6d. to 2s. a ton. Bessemer iron is 1s. dearer. There is a better inquiry for finished iron, which is in a rising tendency. Although the output of steel is very large, makers are unable to overtake the demand, and much less able to accept orders which are offering, and, as a consequence, a further enhancement is announced in values. The activity in ship-building is growing, while engineers are doing exceedingly well.—*Iron.*

Cremation in Italy.—In no country has cremation apparently made such progress as in Italy, the system having now been introduced in 41 communes, 21 of which possess crematoria, whilst others are in course of erection.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	7	0	0	7	15	0
Teak, E.I. ....load	12	0	0	14	0	0
Sequoia, U.S. ....foot cube	0	2	3	0	3	0
Ash, Canada ....load	3	10	0	5	0	0
Birch ,, ...,,	3	10	0	6	0	0
Elm ,, ...,,	4	0	0	5	0	0
Fir, Dantzic, &c. ....,,	2	0	0	3	10	0
Oak ,, ...,,	3	10	0	4	10	0
Canada ....,,	5	10	0	7	10	0
Pine, Canada red ....,,	3	0	0	4	0	0
,, yellow ....,,	3	10	0	5	5	0
Lath, Dantzic ....fathom	4	10	0	5	10	0
St. Petersburg ....,,	5	0	0	6	10	0
Wainscot, Riga, &c. ....log	3	15	0	4	5	0
Deals, Finland, 2nd and 1st..std. 100	0	0	0	11	0	0
,, 4th and 3rd ....,,	7	10	0	8	15	0
Riga ....,,	7	0	0	9	0	0
St. Petersburg, 1st yellow ....,,	11	0	0	15	0	0
,, 2nd ,, ...,,	10	0	0	11	0	0
,, white ,, ...,,	7	0	0	10	10	0

TIMBER (*continued*).	£.	s.	d.	£.	s.	d.
Swedish ....,,	9	0	0	16	0	0
White Sea ....,,	9	10	0	17	0	0
Canada, Pine, 1st ....,,	16	0	0	26	0	0
,, ,, 2nd ....,,	11	0	0	17	10	0
,, ,, 3rd, &c. ....,,	9	0	0	10	10	0
,, Spruce, 1st ....,,	9	10	0	11	0	0
,, 2nd and 2nd ....,,	7	0	0	9	0	0
New Brunswick, &c. ....,,	6	10	0	8	10	0
Battens, all kinds ....,,	6	10	0	19	0	0
Flooring Boards, sq., 1 in., prepared, First ....,,	0	11	0	0	14	6
Second ....,,	0	8	0	0	10	9
Other qualities ....,,	0	5	6	0	7	9
Cedar, Cuba ....foot	0	0	4½	0	0	4½
Honduras, &c. ....,,	0	0	4½	0	0	4½
Mahogany, Cuba ....,,	0	0	4½	0	0	6½
St. Domingo, cargo average ....,,	0	0	4½	0	0	6½
Mexican ,, ...,,	0	0	4½	0	0	5½
Tobasco ,, ...,,	0	0	5½	0	0	6½
Honduras ,, ...,,	0	0	5½	0	0	6½
Box, Turkey ....ton	6	0	0	15	0	0
Rose, Rio ....,,	15	0	0	20	0	0
Bahia ....,,	14	0	0	18	0	0
Satin, St. Domingo ....foot	0	0	6	0	1	0
Porto Rico ....,,	0	0	9	0	1	3
Walnut, Italian ....,,	0	0	4½	0	0	8½

METALS.	£.	s.	d.	£.	s.	d.
Iron—Bar, Welsh, in London ....ton	5	5	0	5	10	0
,, ,, at works in Wales ....,,	4	15	0	5	0	0
,, Staffordshire, in London ....,,	5	10	0	6	10	0
Copper—						
British, cake and ingot ....ton	66	0	0	0	0	0
Best selected ....,,	67	0	0	67	10	0
Sheets, strong ....,,	83	10	0	0	0	0
Chili, bars ....,,	41	15	0	42	0	0
Yellow Metal ....lb.	0	0	5	0	0	5½
Tin—						
Straits ....ton	89	15	0	0	0	0
Australian ....,,	89	15	0	0	0	0
English Ingots ....,,	93	10	0	0	0	0
Zinc—English sheet ....ton	21	0	0	22	0	0
OILS.						
Linseed ....ton	20	15	0	21	2	6
Cocoanut, Cochin ....,,	26	10	0	27	10	0
Ceylon ....,,	23	10	0	24	0	0
Palm, Lagos ....,,	25	0	0	25	10	0
Rapeseed, English pale ....,,	30	10	0	0	0	0
,, brown ....,,	29	0	0	0	0	0
Cottonseed, refined ....,,	26	10	0	27	10	0
Tallow and Oleine ....,,	21	0	0	40	0	0
Lubricating, U.S. ....,,	5	0	0	6	0	0
,, refined ....,,	7	0	0	12	0	0
Tar—Stockholm ....barrel	1	3	6	1	4	0
Archangel ....,,	0	15	9	0	16	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Heating Apparatus, New Gallery, &c.	Congleton Corporation	W. Sugden & Son	Aug. 7th	ii.
Broken Guernsey Granite	Mile End Vestry	J. M. Knight	do.	ii.
Wrought-Iron Gates	Manchester Corp.	G. H. Hill	do.	ii.
Brick and Pipe Sewers, &c.	St. Marylebone Vestry	*Official*	Aug. 8th	x.
Quay Wall	Belfast Corporation	do.	Aug. 9th	ii.
Laundry and Premises, South Acton		E. Monson, Jun.	Aug. 10th	x.
Paving Street	Finchley Local Board	*Official*	Aug. 12th	ii.
Cast-Iron Piles	Cromer Commissioners	do.	Aug. 13th	ii.
Six Blocks of Buildings, Hoxton	F. Dredge, Esq.	D. Lewis Poole	do.	xi.
Sewerage and Water Supply Works	Sevenoaks R.S.A.	T. Hennell	do.	x.
Painting, &c., Works	Paddington Guardians	A. & C. Harston	do.	xi.
Painting, &c., Interior of Workhouse Dining Hall	St. Leonard (Shoreditch) Guardians	F. J. Smith	Aug. 14th	x.
Two Iron Bridges	Leicester Corporation	*Official*	do.	xi.
Waterworks	Kettering Waterworks Company	T. Hennell	Aug. 15th	x.
New Station and Road, Abertillery	G. W. R. Co.	*Official*	do.	ii.
Boundary Walls, Yeovil		E. Vining	Aug. 17th	xi.
Railway Footbridges	Dover Town Council	*Official*	Aug. 20th	x.
New Infant Schools, Reckleford	Yeovil School Board	do.	do.	ii.
Pier and Promenade	Dover Promenade Pier Co., Limited	J. J. Webster	do.	ii.
Erection of House	Gloucester County Asy.	*Official*	Aug. 24th	ii.
New Church	Queen's Park Congregational Church Com.	Rowland Plumbe	Not stated	ii.
Premises in Short's Gardens, W.C.	London Medical Mission	W. & B. Pite	do.	xi.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
County Surveyor	Notts County Council	500*l.*	Aug. 12th	xvi.
Borough Surveyor	Leicester Corporation	700*l.*, &c.	Aug. 17th	xvi.
Resident Engineer	Manchester Corp.	450*l.*	Aug. 20th	xvi.
Civil Engineering Draughtsman	Hull Corporation	100*l.*	Not stated.	xvi.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

BARKING.—For 9,125 tons lime, for the London County Council, delivered at Barking Creek:—

	s.	d.
Minera Lime Co. ....per ton	22	6
Constable & Co.	20	6
G. W. Sopwell	18	0
Hilton Anderson	17	0
Buxton Lime Co.	17	0
Christopherson & Co.	16	0
Lee, Son, & Co.	16	0
Skelton & Co. (accepted)	16	0
Hilton Anderson, for 2,000 tons burr lime	13	6

BROMLEY-BY-BOW.—For the erection of a three-storied factory in Three Mills Lane, Bromley-by-Bow, E., for Messrs. Kemball Bishop & Co. Mr. John Hudson, architect, 80, Leman-street, E.:—

Bentley, Waltham	£2,365 0 0
Little, Whitechapel	2,349 0 0
Gladding, Mile-end	2,293 0 0
Holland, Poplar	2,248 0 0
Norton, Stratford	2,097 0 0
Eaton & Co., Whitechapel (accepted)	2,045 0 0

CROYDON. — For the erection of a detached villa, Morland-road, Addiscombe, for Dr. Hobson. Mr. D. R. Dale, architect, 8, Union-court, E.C.:—

Bailey	£1,850 0 0
Hoare & Son	1,780 0 0
Docking	1,470 0 0
Dewdney	1,360 0 0

DEPTFORD.—For alterations and additions to Messrs. Stone & Co.'s premises, Deptford. Messrs. Stock, Page, & Stock, architects. Quantities by Messrs. Lindsell & Giffard.

Chappell	£1,968 0 0
B. Wells	1,777 0 0
A. White & Co.	1,698 0 0
Pritchard	1,695 0 0
J. & J. Greenwood	1,680 0 0
Rider & Son	1,658 0 0
Nightingale	1,643 0 0

CROYDON.—For the erection of seven detached villas in Camden-road, South Croydon. Mr. D. R. Dale, architect, 8, Union-court, E.C.:—

Dewdney	£7,990 0 0

[No competition.]

EXMOUTH.—For building a farm-house at Woodbury Salterton, for Mr. J. Radford. Messrs. Kerley & Ellis, architects, Exmouth:—

Toser, Exmouth	£503 0 0
Steer, Clyst	552 15 0
Stokes, Woodbury	535 11 0
Pring, Exmouth	490 0 0
Quicke, Lympstone	450 0 0
Long, Exmouth	450 0 0
Hayman, Exmouth (accepted)	368 8 0

EXMOUTH.—For carrying out certain alterations, building new shop, &c., Rolle-street, Exmouth, for Mr. John Toser, grocer. Messrs. Kerley & Ellis, architects, Exmouth:—

Burridge, Exmouth	£295 0 0
Stokes, Exmouth	259 0 0
Quicke, Lympstone	246 0 0
Hayman, Exmouth	226 0 0
Toser, Exmouth	209 15 0
Long, Exmouth	200 0 0
Cooper & Son, Exmouth (accepted)	198 0 0

EXMOUTH.—For building ornamental pavilion, refreshment-room, cloak-rooms, &c., for Mr. Harry Perry. Messrs. Kerley & Ellis, architects, Exmouth:—

Toser, Exmouth	£375 15 0
Bradbeer & Grace, Exmouth	320 0 0
Perry, Exmouth (accepted)	270 0 0
Rogers & Co., Exmouth	260 0 0
Cooper & Son, Exmouth	250 0 0

GRAVESEND.—For the erection of a temporary chimney-shaft, setting boiler, and foundations and walls of new tower up to ground-line, at the Wellington Brewery, for the trustees of the late Mr. A. Walker. Mr. Arthur Kinder, architect, Suffolk House, Lawrence Pountney-hill, London, E.C. Quantities by Mr. Alexander H. Kinder, 34, Clement's-lane, London, E.C.:—

Wall Bros., Kentish-town	£469 0 0
Mutton & Wallis, Gravesend	417 0 0
W. & R. Wallis, Gravesend	411 18 0
Geo. Gates, Rochester	390 0 0
Jonas Hill, Gravesend	338 19 8
Herbert Stiff, Dover	335 0 0
W. H. Archer, Gravesend (accepted)	316 0 0

LINCOLN.—For the ventilation, by power, of the whole of the central stores of the Lincoln Equitable Industrial Co-operative Society, Limited. Mr. Frederic Smith, 29, Bridgewater-chambers, 6, Brown-street, Manchester, architect:—

Blackman Ventilating Co. (accepted)	£151 10 0

For Power Hoists to above.

H. Wren & Co.	£245 0 0
Higginbottom & Mannock (accepted)	198 0 0

LONDON.—For the construction of a viaduct carriage-way, footways, sewers, &c., between Clerkenwell-road and Farringdon-road (to form part of the new street between Holborn and Islington) for the London County Council:—

T. Gibson & Co., No. 2, Westminster-chambers	£33,893 15 4
J. W. & J. Neave, Marlborough-road, Leytonstone	27,586 0 0
F. H. Culverhouse & Co., Pratt's Wharf, King's-road Bridge, Camden Town	27,075 8 6
C. Killingback, Ice Well Wharf, James-street, Camden Town	26,480 0 0
Nowell & Robson, Warwick-road, Kensington	26,300 0 0
G. Double, Kirby Lodge, St. John's, Ipswich	25,851 15 4
J. Mowlem & Co., Grosvenor Wharf, Westminster	25,287 0 0
Brass & Son, No. 47, Old-street	24,776 0 0
Holme & King, No. 193, Stanhope-street, Euston-road	24,475 0 0
T. Docwra & Son, Ball's-pond, N.	23,436 0 0
J. Biggs, Farm-street, Birmingham, and Stamford-terrace, Stoke Newington	23,393 0 0
W. Griffiths, No. 283, Kingsland-road	22,690 0 0
T. Adams, No. 22, Canal-road, Kingsland	22,306 17 0
J. Dickson Townsend, St. Alban's, Herts	21,395 15 0

LONDON.—For cleaning, painting, &c., of the offices of the London County Council, Spring-gardens:—

John Grover & Son	£741 0 0!
John Clemence	425 0 0
David E. Laing & Son	329 0 0
Patman & Fotheringham	325 0 0
Stimpson & Co.	313 0 0
J. & J. Greenwood (accepted)	299 0 0!

LONDON.—For alterations of Council Chamber and offices at Spring Gardens, for the London County Council. Mr. Thomas Blashill, Architect:—

Brass & Son	£8,970 0 0
J. Mowlem & Co.	8,782 0 0
Garlick & Horton, Limited	8,350 0 0
Kirk & Randall	8,216 0 0
G. McCormick & Sons	7,833 0 0
Stimpson & Co.	7,480 0 0
T. Elkington	7,350 0 0
D. Charteris	7,324 0 0
J. & J. Greenwood	7,091 0 0
J. Allen & Son (accepted)	6,600 0 0

LONDON.—For alterations to dispensary, medical officer's residence, &c., for the Guardians of the Whitechapel Union. Mr. B. J. Capel, architect, 70, Whitechapel-road:—

Lobb & Oliver,* New Southgate, N.	£1,764 0 0

* Accepted.

[Full list appeared last week, p. 71.]

LONDON.—For new front to No. 22, Aldgate, E.C., for Mr. J. Pedley. Mr. John Hudson, architect, 80, Leman-street, E.:—

Gladding, Mile-end (accepted)	£110

LONDON.—For the enlargement of the Rotherhithe New-road School, Southwark, by 428 places, for the School-board for London. Mr. T. J. Bailey, architect:—

J. Tyerman	£15,749 0 0
No name	12,255 0 0
A. & W. Garnar	12,063 0 0
J. Longley & Co.*	11,511 0 0

* Recommended by the Works Committee for acceptance.

LONDON.—For repairs and alterations at the Jessop-road School, Herne-hill, for the School Board for London. Mr. T. J. Bailey, architect:—

J. Derry	£1,594 0 0
H. Walkley	1,350 0 0
H. G. Heywood (accepted)	1,235 0 0

LONDON.—For the erection of a new house for the school-keeper, together with the cookery centre, in one block, on the Ricardo-street site, Poplar, for the School Board for London. Mr. T. J. Bailey, architect:—

J. Webb	£2,225 0 0
T. Linfield	1,992 0 0
J. Edmunds	1,984 0 0
H. Bacon	1,979 4 6
Norris & Luke	1,594 0 0
Barrett & Power (accepted)	1,555 0 0

LONDON.—For overhauling and improving the Saunders-road School, Notting-hill, for the School Board for London. Mr. T. J. Bailey, architect:—

T. W. Haylock	£1,842 0 0
H. Walkley	1,798 0 0
J. W. Sawyer (accepted)	1,789 0 0

LONDON.—For the enlargement of the St. Andrew's-street School, Battersea, by 400 places, for the School Board for London. Mr. T. J. Bailey, architect:—

J. Tyerman	£4,507 0 0
J. Holloway	4,171 0 0
Holloway Bros.	4,077 0 0
H. Knight*	3,985 19 6
J. Longley & Co.	3,917 0 0

*Recommended by the Works Committee for acceptance.

LONDON.—For providing new windows for the boys' department and improving the lighting of the girls' department at the Northey-street schools, for the School Board for London. Mr. T. J. Bailey, architect:—

Holloway Bros.	£220 0 0
J. Holloway	209 0 0
J. Derry (accepted)	190 0 0

LONDON.—For erecting three new iron buildings on the Honeywell-road site, Wandsworth, for the School Board for London. Mr. T. J. Bailey, architect:—

W. Jones	£1,632 15 0
M. Harbron	1,617 7 6
J. J. Richards	1,478 0 0
North & Son	1,470 0 0
J. W. Smales	1,400 0 0
A. W. Pocock*	1,275 0 0
J. C. Humphreys	1,135 0 0
	850 0 0

* Recommended by the Works Committee for acceptance.

LONDON.—For extending heating apparatus on the low-pressure hot-water system, and providing a new boiler at the Schools in New-road, Wandsworth-road, for the School Board for London. Mr. T. J. Bailey, architect:—

Clements, Jeakes, & Co.	£595 15 0
T. Wood & Co.	594 0 0
Hayward Bros. & Eckstein	588 0 0
Ridsdale & Co.	594 0 0
W. G. Cannon	515 0 0
T. Green & Son (Limited)	497 9 2
Purcell & Nobbs	492 0 0
J. F. Clarke	485 17 0
J. & F. May (accepted)	477 5 6

LONDON.—For extending the heating apparatus on the low pressure steam system, and providing new boiler and additional coils at the Oban-street schools, for the School Board for London. Mr. T. J. Bailey, architect.

T. Wood & Co.	£585 0 0
J. & F. May	485 11 9
J. F. Clarke	407 12 7
Ridsdale & Co.	352 16 0
T. Green & Son, Limited	349 17 2
W. G. Cannon (accepted)	310 10 0

LONDON.—For the enlargement of the Princess-road School, Regent's Park, by 230 places, for the School Board for London. Mr. T. J. Bailey, architect:—

W. Goodman	£2,699 0 0
W. L. Kellaway	2,656 0 0
J. Derry	2,566 0 0
J. Longley & Co.	2,479 0 0
W. M. Dabbs*	2,447 0 0

* Recommended by the Works Committee for acceptance.

LONDON.—For extending heating apparatus on the low-pressure hot water system, and providing a new boiler at the Monteith-road School, for the School Board for London. Mr. T. J. Bailey, architect:—

T. Wood & Co.	£200 0 0
Ridsdale & Co.	167 18 6
J. & F. May	149 12 0
J. F. Clarke	148 14 0
W. G. Cannon	141 0 0
J. Wontner Smith, Gray, & Co.	137 15 0
T. Green & Son, Limited (accepted)	132 0 0
Purcell & Nobbs	98 0 0

LONDON.—For extending the heating apparatus on the low-pressure hot-water system and providing a new boiler at the Bell-street School, for the School Board for London Mr. T. J. Bailey, architect:—

T. Wood & Co.	£570 0 0
Ridsdale & Co.	397 4 0
W. G. Cannon	285 10 0
J. & F. May	282 14 0
T. Green & Son	256 3 5
J. W. Smith, Gray, & Co.	253 0 0
J. F. Clarke	251 7 8
Purcell & Nobbs (accepted)	237 0 0

LONDON.—For cleaning and painting the interior and exterior of the Saffron-hill School, and for providing additional lighting, &c., for the School Board for London. Mr. T. J. Bailey, architect:—

J. W. Sawyer	£461 0 0
J. Holloway	426 0 0
G. Parker	399 0 0
Holloway Bros. (accepted)	327 0 0

LONDON.—For providing additional lighting, stepped floor, and Kindergarten gallery, for the Infants' Department of the Chequer-alley Schools, for the School Board for London. Mr. T. J. Bailey, architect:—

Holloway Bros.	£437 0 0
J. Holloway	420 0 0
G. Parker	390 0 0
J. Derry (accepted)	310 0 0

LONDON.—For providing an iron communication staircase for the Boys' Department at the Baltic-street School, for the School Board for London. Mr. T. J. Bailey, architect:—

R. Knight	£199 10 0
J. Stone	188 10 0
G. Smith & Co.	156 0 0
W. Jones	155 0 0
L. Faulkner & Sons	126 0 0
St. Pancras Iron Works Co.*	122 0 0

* Accepted.

LONDON.—For the construction of a wharf upon the site of the Old Toll House, Putney Bridge. Mr. James P. Norrington, Surveyor to the Vestry:—

Downa	£2,953 0 0
Neave & Son	2,814 0 0
Nowell & Robson	2,772 0 0
Marriott	2,713 0 0
Tomes & Wimpey	2,413 0 0
Bell	2,353 0 0
R. Mayo	2,200 0 0

LONDON.—For addition to the Sumner Printing Works, Sumner-street, Southwark, S.E., for Messrs. Riddle & Couchman. Messrs. Romaine-Walker & Tanner, architects. Quantities supplied by Mr. Pryce Cuzner, surveyor:—

Patman & Fotheringham	£6,973 0 0
J. & J. Greenwood	6,863 0 0
Grover & Son	6,784 0 0
Hy. Hart	6,720 0 0
Rider & Son	6,638 0 0
Wm. Downs	6,572 0 0
Holloway Bros.	6,474 0 0
Higgs & Hill (accepted)	6,366 0 0

LONDON.—For the erection of Public Library, &c., at Lower-road, Rotherithe. Messrs. Stock, Page, & Stock, architects. Quantities by Messrs. Lisdell & Gifford:—

	If Bath stone be used.			
Rider & Son	£3,318	Deduct £33	...	£3,285
J. & J. Greenwood	3,169	,, 30	...	3,139
J. Downs	3,160	,, 85	...	3,075
Holland & Hannen	3,148	,, 80	...	3,068
Chappell	3,090	,, 50	...	3,040
Nightingale	3,094	,, 80	...	3,014
Pritchard	3,051	,, 81	...	2,970
Marsland	3,035	,, 140	...	2,895
A. White & Co.	3,025	,, 150	...	2,875
B. Wells	2,727	,, 60	...	2,667

LONDON.—For alterations and repairs to dwelling-houses, Nos. 7 and 8, Beaumont-street, Marylebone, W., for Mr. Joseph Chaplin. Mr. Thomas Durrans, architect, 44, Upper Baker-street, N.W.:—

White	£2,195 0 0
Stokes and Pinder	2,164 12 0
Stevenson	2,061 0 0
Foxley & Co.	2,042 0 0
Birch	1,677 0 0
Falkner & Co.	1,675 0 0
Oldrey & Co.	1,649 0 0
Manktelow	1,535 0 0
Taylor	1,444 0 0
Higgs	1,207 0 0
Turtle & Appleton (accepted)	1,215 0 0

LONDON.—For the rebuilding of warehouse premises, 16 and 18, Brushfield-street, Bishopsgate, E.C., for Messrs. S. & L. Beck. Mr. J. W. Brooker, architect, 13, Railway-approach, London-bridge, S.E.:—

Jackson & Todd	£1,699 0 0
W. Downs	1,645 0 0
W. & F. Croaker	1,584 0 0
Kelland	1,550 0 0
Burman & Sons	1,545 0 0
Reynolds	1,484 0 0
Kirk	1,325 0 0
Battley (accepted)	1,297 0 0

LONDON.—For erecting new coachhouse at Dorset Works, East-road, City-road, N., for Messrs. Dottridge Bros. Mr. A. G. Collins, architect, 30, Finsbury-pavement, E.C.:—

T. Nixon	£205 0 0
H. J. Williams,* Bermondsey-street	187 10 0

* Accepted.

LONDON.—For erecting new stables at Dorset Works, East-road, N., for Messrs. Dottridge Bros. Mr. A. G. Collins, architect, 30, Finsbury-pavement, E.C.:—

J. Chessum & Sons	£202 0 0
T. Nixon	195 0 0
J. Godfrey & Son, Clapton (accepted)	190 0 0

(Exclusive of stable-fittings, drainage, and paving.)

LONDON.—For alterations, additions, and sanitary works, 11, Ladbroke-terrace, W. Mr. Lewis Solomon, architect, 55, New Broad-street, E.C.:—

Foxley	£1,408 0 0
Sayer	1,395 0 0
Vernall & Griffiths	1,359 0 0
Kellaway (accepted)	1,234 0 0

LONDON.—For repairs and sanitary works, at 24, Pembridge-villas, W. Mr. Lewis Solomon, architect:—

Watts	£491 0 0
Bishop	469 0 0
Roberts (accepted)	437 0 0
Pike	437 0 0

LONDON.—For cleaning, distempering, painting, and general repairs internally and externally, at the Birkbeck Literary and Scientific Institution, Chancery-lane, E.C. Mr. Henry Bushell, P.A.S.I., surveyor, 1, Finsbury-circus, E.C.:—

B. Nightingale	£311 6 0
Dove Bros.	301 5 0
L. Lundy, Shepherd's-bush	233 14 4
J. Edmunds, Poplar	224 0 0
N. Lidstone, Finsbury-park	174 15 0
Laing & Son, Adelphi (accepted)	159 5 0

[Surveyor's estimate, £214.]

LONDON.—For repairs to St. Mary's Schools, Spital-square, E., for Rev. Morris Thomas. Mr. D. R. Dale, architect, 6, Union-court, E.C.:—

Brady	£228 0 0
Kiddle & Son	213 16 0
Pritchard & Son	196 1 0
Rayner	187 5 0
Hoare & Son (accepted)	166 10 0

LONDON.—For new workshops at the Workhouse, Garratt-lane, Wandsworth, for the Guardians. Mr. T. W. Aldwinckle, architect. Quantities supplied:—

Jewell, Wandsworth	£1,735 0 0
Schofield, Deptford	1,700 0 0
Parsons, Battersea	1,693 0 0
Hammond, Battersea	1,675 0 0
Armitage, Clapham	1,642 0 0
Field, Battersea	1,637 0 0
Whitehead, Clapham	1,550 0 0
Marsland, Wandsworth	1,543 0 0
Johnson, Wandsworth-common	1,467 0 0
Garner, Peckham	1,470 0 0
Turtle & Appleton, Clapham	1,445 0 0
T. Potterton, Balham*	1,374 0 0
Dickeson & Wallis, Balham†	1,328 0 0
Ward & Co., Peckham	1,310 0 0

* Accepted. † Withdrawn.

LONDON.—For erecting two warehouses in City-road. Mr. J. Ferrar, architect, 20, Albion-chambers, Finsbury-pavement:—

Lobb & Oliver,* New Southgate, N.	£2,551 0 0

* Accepted.

LONDON.—For rebuilding No. 21, Aldgate, E.C., for Mr. E. Konig. Mr. John Hudson, architect, 80, Leman-street, E.:—

Eaton, Whitechapel	£956
Little, Whitechapel	924
Gladding, Mile-end (accepted)	798

MANCHESTER.—For new stabling, shed, and additional lairs, at the abattoirs of the Pendleton Co-operative Industrial Society, Limited, and in Cheltenham-street, Pendleton. Mr. Frederic Smith, architect, Manchester. Quantities by the architect:—

Jones	£2,390 0 0
W. Southern & Sons	2,270 0 0
J. Lindsay & Son	2,264 0 0
Statham & Sons	2,249 0 0
J. Ramsbottom	2,218 0 0
R. Neill & Sons (accepted)	2,171 0 0

MANCHESTER.—For new engineering workshop, in Green-lane, Old Garratt, for Mr. Hans Renold. Mr. Frederic Smith, 29, Bridgewater-chambers, 6, Brown-street, Manchester. Quantities by the architect:—

W. Harrison	£898 0 0
Burgess & Galt	890 0 0
J. Hibbert	845 0 0
W. Southern & Sons (accepted)	807 0 0
J. Robinson	796 0 0

MANCHESTER.—For two shops and ware-rooms, &c., on Edgod-green, Pendleton, for the Pendleton Co-operative Industrial Society, Limited. Mr. Frederic Smith, architect. Quantities by the architect:—

Jones	£2,300 0 0
W. Southern & Sons	1,995 0 0
Statham & Sons	1,957 0 0
R. Neill & Sons	1,910 0 0
J. Ramsbottom (accepted)	1,849 0 0

MANCHESTER.—For new creamery, &c., at Fallowfield, for the executors of the late Sir Joseph Whitworth, Bart. Mr. Frederic Smith, architect. Quantities by the architect:—

W. Southern & Sons, Salford*	£525 0 0

* Accepted.

MANCHESTER.—For new warehouse and shed in Phillips Park-road, Beswick, at the chemical works of Messrs. Thomas Hyland & Co. Mr. Frederic Smith, architect, Manchester. Quantities by the architect:—

J. Robinson	£544 8 0
W. Harrison	456 0 0
W. Southern & Sons	455 0 0
Burgess & Galt	435 10 0
J. Hibbert	417 0 0
H. and C. Jackson (accepted)	416 0 0

For Ironwork to Above.

Taylor	£426 0 0
Carter Bros. (accepted)	395 3 5

For Concrete Work to Above.

Hindley & Co.	£82 0 0
Hamor Lockwood	45 17 0
Brunswick Rock Asphalte Co. (accepted)	40 15 0

RICKMANSWORTH.—For the erection of a private residence and stabling situate at Long-lane, Mill End, Rickmansworth, Hertfordshire, for Mr. Thomas Wilks. Mr. William M. Yeats, architect, 44, Finsbury-pavement, E.C.:—

J. Base	£4,476 0 0
Faulkner	3,889 0 0
Woodward & Co.	3,797 0 0
Downs	3,767 0 0
Eastmage	3,695 0 0
T. Turner, Limited	3,536 0 0
Waterman	3,337 0 0
Brown	3,310 0 0
W. Gladding (accepted)	3,263 0 0

ST. MARY CRAY (Kent).—For additions and alterations to premises at St. Mary Cray, Kent, for the Cray's Co-operative Society, Limited. Mr. St. Pierre Harris, architect, 1, Basinghall-street, E.C., and Orpington:—

Otway	£1,063 0 0
Hart Bros.	1,095 0 0
Wood	907 0 0
Knight	850 0 0
Lowe (accepted)	799 0 0
W. R. Taylor (withdrawn)	677 0 0

SWANLEY.—For additions and alterations to a house near Swanley, Kent. Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street, E.C., and Orpington:—

Harvey	£893 0 0
Lowe	827 0 0
Payne	732 0 0
Knight	729 0 0

SYDENHAM.—For new stables at Horner Grange, for Mr. W. Knight. Mr. J. Fogerty, 21, Suffolk House, architect:—

Lascelles & Co. (accepted)	£3,381 0 0

SYDENHAM.—For range of vineries and plant-houses, for Mr. W. Knight. Mr. J. Fogerty, architect:—

Lascelles & Co. (accepted)	£1,750 0 0

SYDENHAM.—For new billiard and ball-room, for Mr. W. Knight. Mr. J. Fogerty, architect:—

Lascelles & Co. (accepted)	£1,550 0 0

WEST COWES.—For sinking new well and boring, for the West Cowes Local Board. Mr. W. Brown, engineer, High-road, Tottenham:—

Tickner & Co., London	£3,350 0 0
Hill & Co., Gosport (accepted)	3,084 0 0

Rebuilding No. 29, Hereford-street, Mayfair.—The amount extra for Portland stone in Messrs. Higgs & Hill's tender was not £1,500, as stated in our last, but £15 only. The error was that of a copyist, and it inadvertently escaped notice.

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